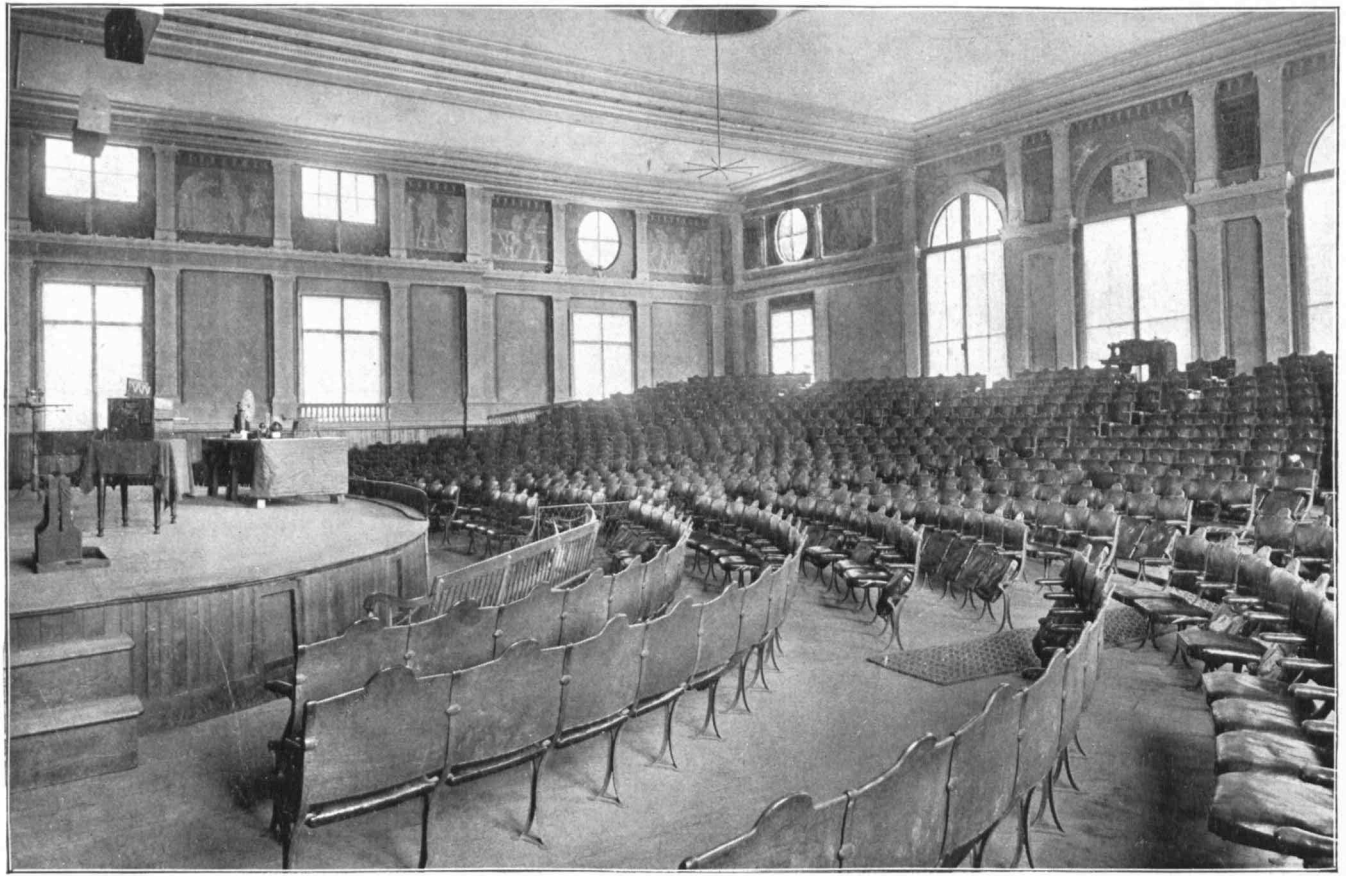

HUNTINGTON HALL

Showing Frieze on North and West Walls

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HUNTINGTON HALL FRIEZE

The proposed restoration of the Huntington Hall Frieze, which was painted out in 1898, makes it desirable to recall its interesting history, so intimately connected with the early days of the Institute. (See Note A.)

In 1870 Professor William R. Ware, of the architectural department, in consultation with President Rogers and other members of the Corporation, appointed Mr. Paul Nefflen to make the sketches and carry out the work of completing Huntington Hall, in the Rogers Building, which had remained five years unfinished on account of lack of funds, by painting upon its walls a mural decoration to represent the subjects taught in the school and the Industrial Arts.

Mr. Nefflen was born in Würtemberg, was educated in the art schools at Stuttgart, and came to America in 1851. He had executed admirable decorations in Boston and in Syracuse, N.Y. (See Note B.)

The walls of the hall are divided by an architectural treatment of pilasters, architrave and cornice, and in the panels of the wide frieze above this architrave, on a level with the oval windows, were painted these groups. The color scheme was monochromatic, the figures, in yellow, being rather vigorously outlined in red against a yellowish-brown background, very light in tone.

A "trial panel," Physics and Astronomy, was first submitted, in the form of a small sketch, for approval (see Folder Nos. 20 and 21); but the first to appear on the wall was the group in the central panel behind the platform, which afterward became the seal of the Institute. (See Note C.) Next to this were small allegorical figures,

and beyond, on the right, Chemistry and Mining; on the left, Engineering and Architecture. The figures were about four feet in height. The panel Chemistry (No. 1) showed the interior of a laboratory and the manufacture of sulphuric acid. Mining (Nos. 2 and 3) depicts the interior of a coal mine. No reproductions are given of Engineering, which was represented by "a long steel tubular bridge," or of Architecture, a panel showing "a half-completed stone stairway, with the rough, untrimmed edges of the foundation still exposed to view," these being the panels to the left of the platform over the easterly entrance.

For filling in the remaining panels and paying the expenses of the decoration, outside assistance was sought. Different manufacturers in Massachusetts (see Note D) contributed a hundred dollars apiece to have their processes permanently displayed on the walls of this prominent technical institution; and Mr. Nefflen, with his sketch-book, visited the paper-mills of Holyoke, the wire-cloth mills at Clinton,—where he sketched the "Bigelow wire loom,"—and brick-yards, iron foundries, potteries, and textile manufactories near Boston. His sketches, though often crude, caught much of the spirit and action of the operatives in the different trades, and expressed, in a simple and decorative way, these methods of work, many of which are now obsolete. His method was preferable for mural painting to much of the brilliantly colored easel-picture work now called by that name. It is quite astonishing to see how he has simplified and flattened out a complicated cotton-printing machine (No. 10), so that it is not at all unsuitable for wall decoration.

A carpenter (No. 4), in characteristic pose, is laying his try-square on the edge of a board along which he is sighting. The students of Mechanical Drawing (No. 6) are in dress as archaic as the locomotive they have designed. In Freehand Drawing (No. 7) one can picture a corner of the Architectural Department or of the Art Museum, among the antique casts. The Rope-walk (No. 8) is a reminiscence of the days of "old salts" and "spinning yarns." This sketch was made in Charlestown. The panel, Casting Iron (No. 9), is a masterpiece, well composed and vigorously

drawn. It is thoroughly American, appropriate to its setting, purpose, and subject. How strange it is that, while we encourage American subjects in fiction, we discourage them in art! Textile Printing (No. 10) shows a faithful drawing of a once familiar machine; and Weaving (No. 11), which is a part of the same panel, recalls the equally forgotten New England mill girls. There were panel decorations over the three windows in the rear of the hall, emblematic of Navigation (No. 12), Electricity, and Telegraphy.

Another sketch (No. 21) was made of the subject Casting Iron; and a long panel (Nos. 20 and 21), in flat colors, representing Physics and Astronomy, was the "trial panel" referred to, required by Professor Ware for approval before the artist could begin his work. Of the executed panels some one has said, "One was a group of godlike youths, led by a bearded professor of preternatural dignity, peering through a telescope and calculating upon a globe."

Pottery (No. 5), Modelling (No. 19), Glass Painting (No. 18), Printing (No. 17), Rolling Wire (No. 16), Shipbuilding (No. 15), Glass-blowing (No. 14), Brick-making (No. 13), Wire-cloth Making, Carpet-making, Paper-making, Paper-ruling and Calendar, Spinning Yarn, Leather Preparation, Stone Cutting, Surveying, and Dyeing were other subjects for which sketches were made. The artist also made studies for Geologic Stratification and Fossils as mural decoration.

It must be remembered that the art of mural painting in America in 1871 was in its infancy. (See Note E.) The figures of "Anahita," the Persian goddess of Night, and of Columbus and the Daybreak, which had been developing in the mind of William M. Hunt since the "forties," were not completed on the walls of the New York State capitol at Albany until seven years later (1878). La Farge was just becoming known, and five years later began his work in Trinity Church, Boston. It would be interesting to know if these simple figures on the walls of the lecture-room where the members of Trinity Church congregation worshipped while their beautiful structure was rising, gave any impetus to the movement for mural painting which has increased so wonderfully in the thirty succeeding years.

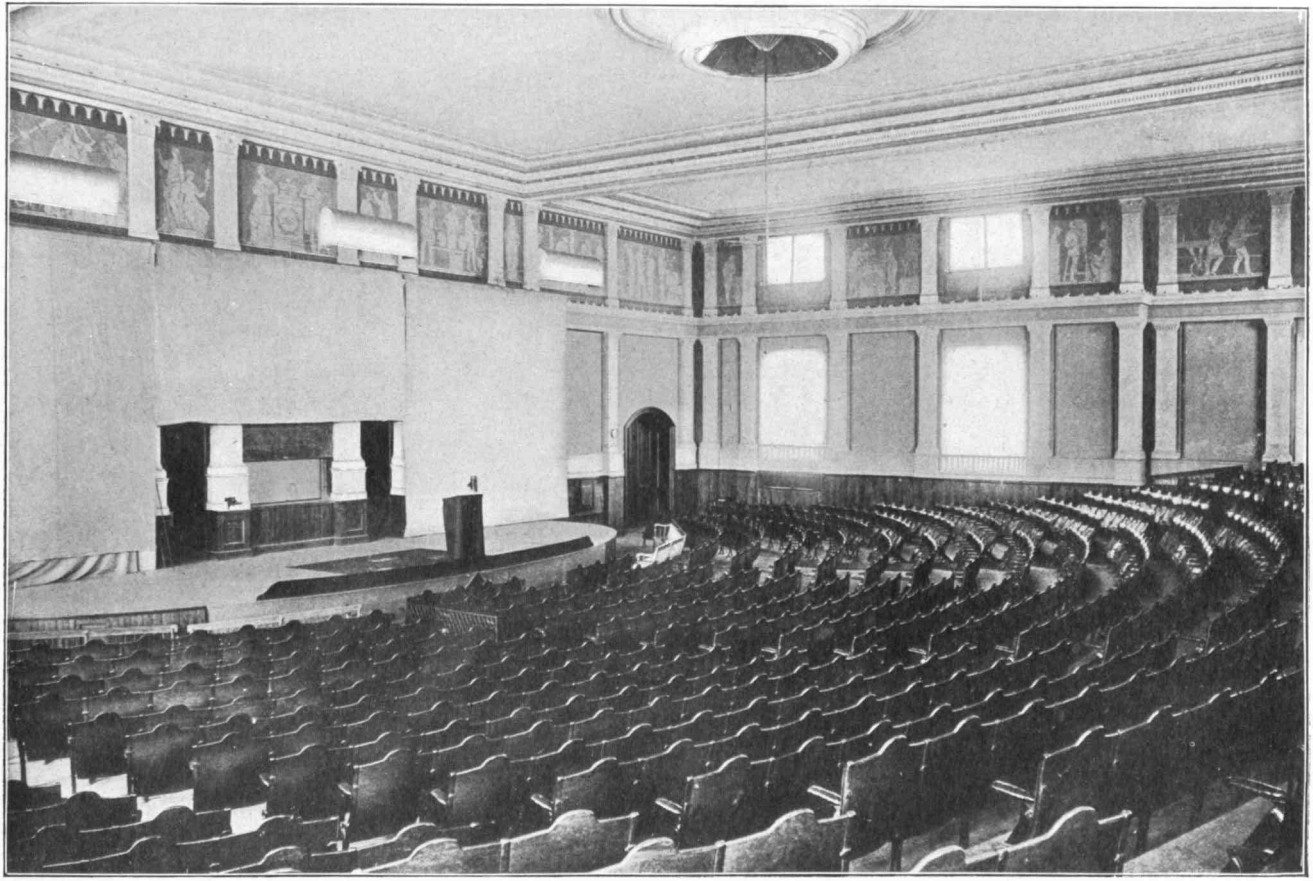
The paintings were pleasing to President Rogers, the founder

of the Institute; and it is well to recall them as a part of the earlier history of the institution which, from simple beginnings, has grown so strong. For many of the students and Faculty they are inseparably connected with Huntington Hall, and formed one of the bonds of sentiment—of which there have been too few at the "Tech"—that drew the affections of many alumni to their Alma Mater. Like stained-glass windows in a church, they often relieved the weight of weary words, and shortened many a long lecture.

The drawings were in water color, directly on the plaster, and were not permanently fixed, so that during the summer vacation of 1898, as they had become badly damaged, painters were requested to put the hall in presentable shape; and a few pails of water, with a scrubbing-brush, was the easiest and quickest solution of the problem. There is no doubt that the decorations were in bad condition, bad in color, very much soiled and defaced; but what a disagreeable surprise it was to returning students and alumni to find no longer the frieze for which so many had come to have a sincere affection!

It was then suggested that an attempt be made to restore the decoration; and Mr. William Gibbons Preston, the architect who planned the Rogers Building, and Dr. H. W. Tyler, the Secretary of the Institute, endeavored to find if any cartoons were in existence. After much correspondence it was found that Mr. Nefflen was dead, but that his widow was living, and that the original sketches were in her possession. At that time it was found impracticable to buy them; but in 1904, through the interest and efforts of three or four men who recalled the frieze, and believed that there was something in it which should not be forgotten, the necessary subscription was raised. By the generosity of twelve contributors, not all connected with the Tech, but all actuated by affection for the Institute or by a desire to promote a love of art in our city and among our technical students, the original sketches were bought, and are shown in the accompanying cuts.

It is hoped that these may form the inspiration and motive for a restored frieze that shall be worthy of the present standing and the ambitious hope of the Institute.



HUNTINGTON HALL FRIEZE

Painted 1871—Removed 1898

The spirit is there in the old frieze,—the spirit of simple, industrious, progressive, technical work. We can restore and complete the frieze much better than was before possible; but we would have to try a long time to find a better expression of a simple and appropriate decoration for a technical school than that expressed, for example, in the panel, Casting Iron (No. 9). Let us restore, then, the same old motive, honored in the history of the Institute, and develop it as it should be developed, with as little or as much money as we can command.

It has been suggested, and taken up already with considerable enthusiasm by the students, that each class restore one or more of the panels of the frieze, as a memorial of the class, on canvas, so that the frames could be removed in case of any change of location.

The central panel over the platform was the Technology Seal. It has been stated that the original suggestion, finally adopted as the seal, was the first sketch for this. It has appeared in many forms in Technology literature, and even, under a clever disguise, in the Technology Club book-plate. The replacing of this has been undertaken by the class of 1905, the approval of the President of the Insitute having first been obtained. He, as we know, approves of everything that will increase the affection of the students for "Tech"; and in this case he has expressed himself in favor of "a new frieze that shall recall what was good in the old and at the same time be characteristic of the present."

One method proposed is to have the subject given as a sketch-problem in the Architectural Department. The Senior Class may depend upon the co-operation of the fifth-year men who complete their work in 1905. The Architectural Department will aid in carrying out a project of this kind, and the students may be sure that anything done on the frieze will be watched with interest by the alumni and many others outside the Institute. It might be that different panels would be contributed by persons interested in the subjects considered, or that aid would be given by such persons to the class putting up the panel.

If, further than this, it is found that money to employ a mural painter of note is available, the work may still be given under the

names of the different classes. It may even be advisable to erect temporary cartoons to be carried out in oils later.

The plan at present is as follows:—

(1) The Senior Class (including all courses) will put up one, three, or five panels, leaving a fund for this purpose, and unveiling either the cartoons or the completed work on Class Day.

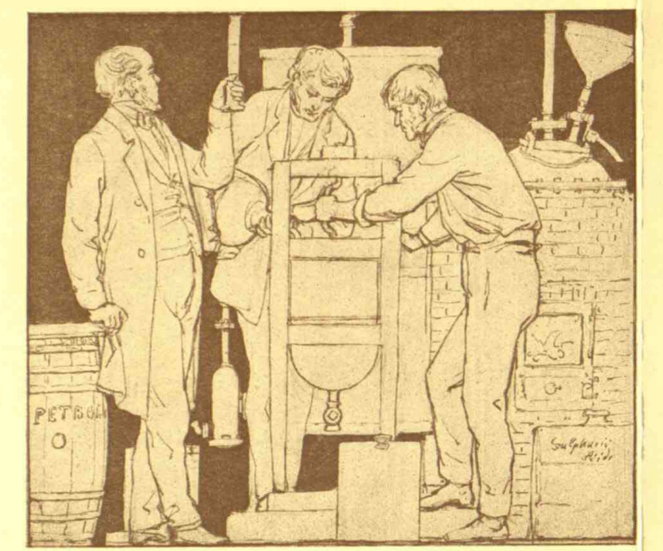
(2) Sketches will be made by students of the Architectural Department, selected from the sixth, fifth, and fourth years, under the supervision of that department, with outside assistance when necessary.

(3) There will be a preliminary problem given out in the Architectural Department, to obtain studies for the general color scheme and treatment of the whole hall; and the color scheme will be worked out under the direction of the department.

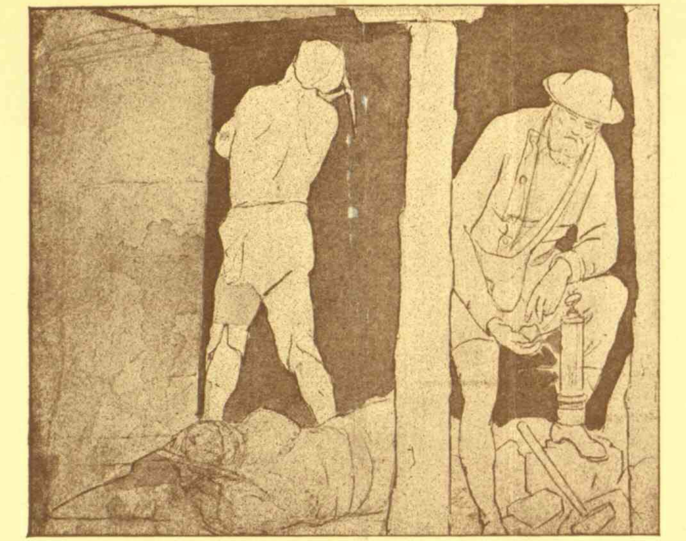
One of the purposes of this article is to express the appreciation of many within and without the Institute for the value historically as an American work of art of this early mural frieze, and to say that the opportunity is still open, though the initiative has already been taken by the admirable action of the Senior Class, to restore this frieze, panel by panel. The co-operation of future graduating classes, of alumni, and of different professions, industrial workers, and manufacturers, is in order.

It has been somewhat difficult to find treatment of wall-surfaces similar to what is wanted at the "Tech." The decorations by Galland (see Note F) on the wall of the Hôtel de Ville in Paris, excepting that the subjects are French instead of American, are appropriate. The figures are in brown on a gold background. They were executed in 1891, twenty years after the "Tech" frieze was painted. E. H. Blashfield has painted a lunette, entitled "Iron," for a bank building in Pittsburg; but the subject is too much idealized, and treated in a manner different from what seems to be demanded at the Institute.

The Institute frieze was unique; and a restored decoration of that unique, simple, direct character of processes in current use at the time they are painted, but treated broadly, as appropriate for mural painting, is the "Tech Frieze" for which we are working.



1. Chemistry: Sulphuric Acid

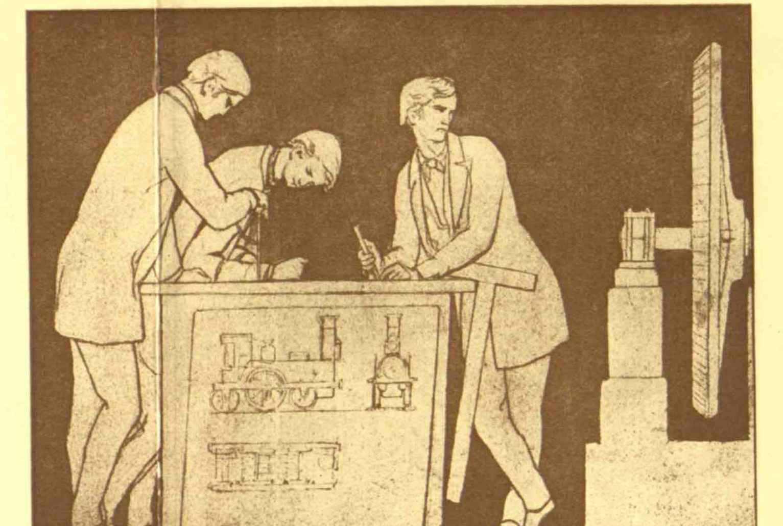


2. Mining

3. Mining

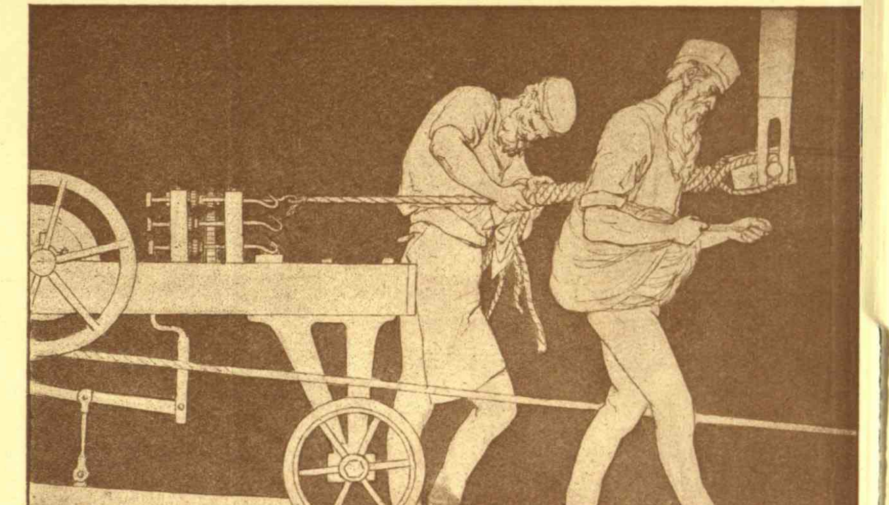
4. Carpentry

5. Potter

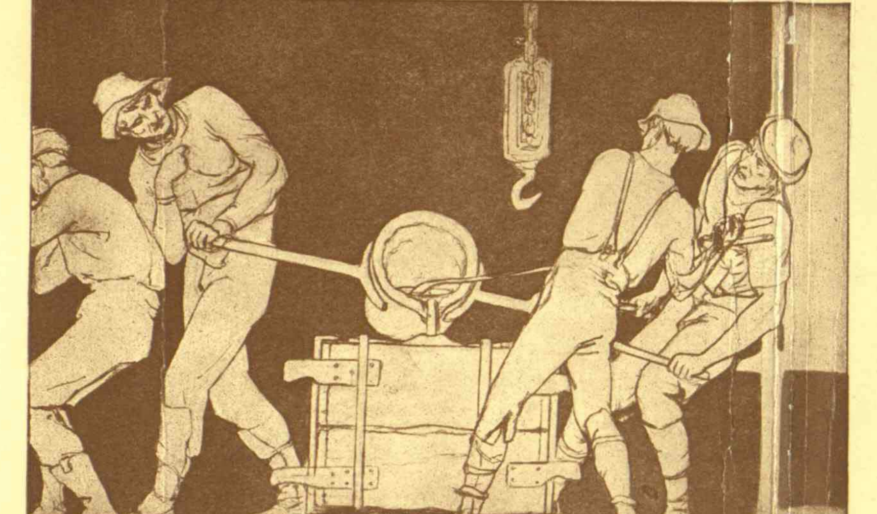


6. Mechanical Drawing

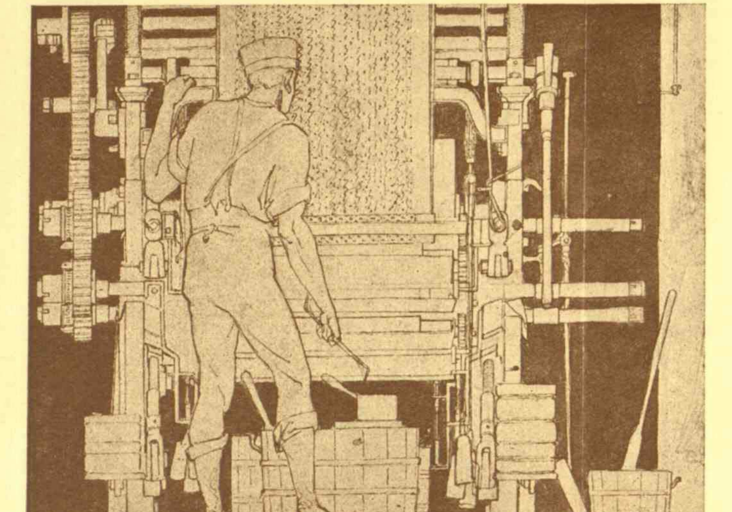
7. Freehand Drawing



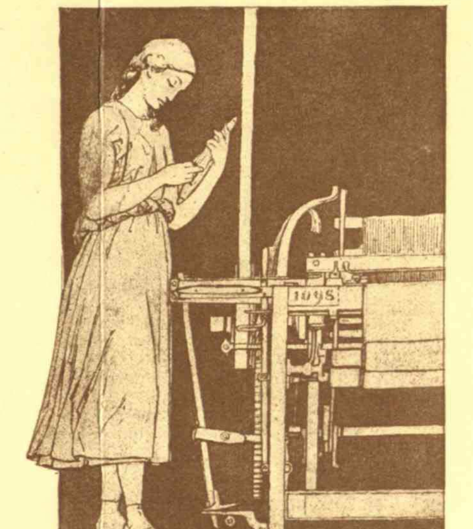
8. Ropewalk.



9. Iron Casting



10. Textile Printing

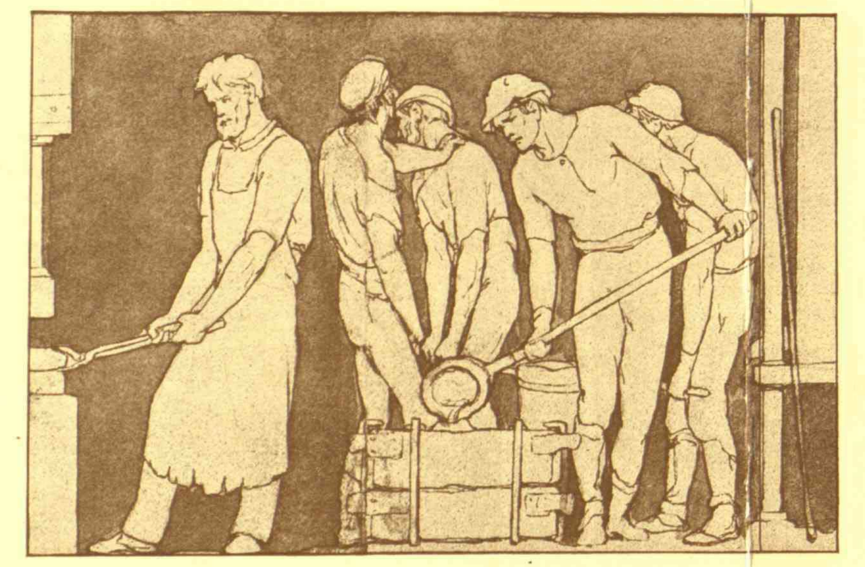


11. Weaving

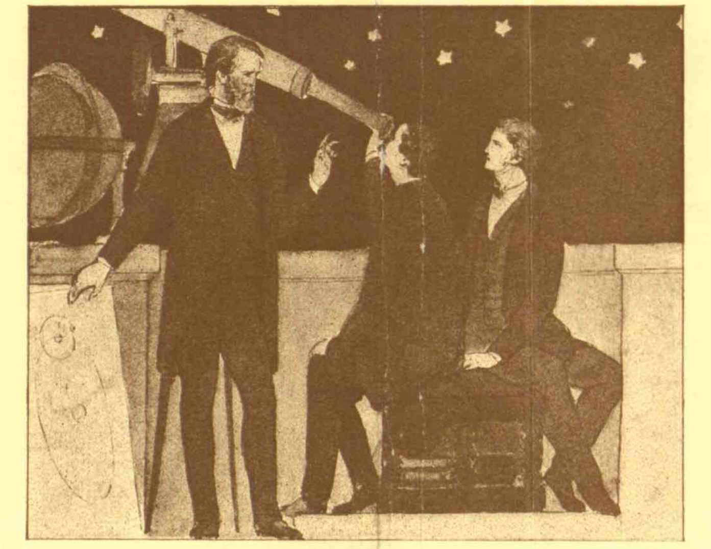
HUNTINGTON HALL FRIEZE

Sketches by Paul Nefflen, 1871

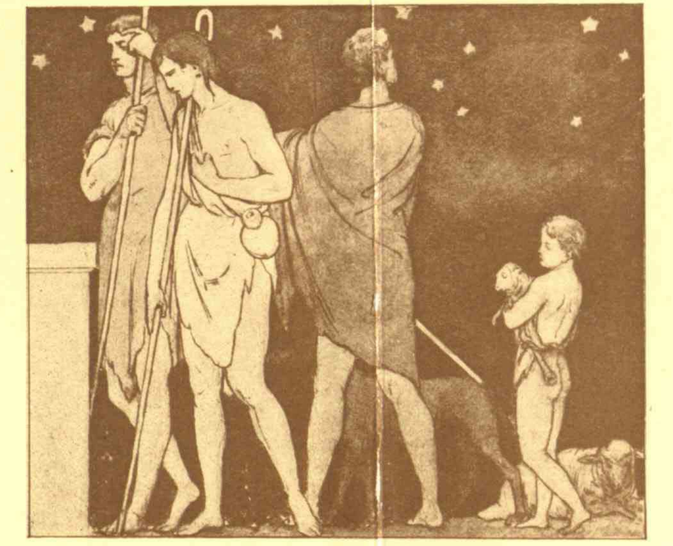
See article by
Frank A. Bourne, '95,
Technology Review
April, 1905.



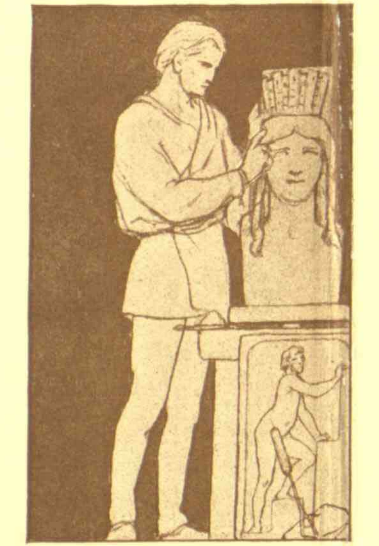
22. Iron Casting



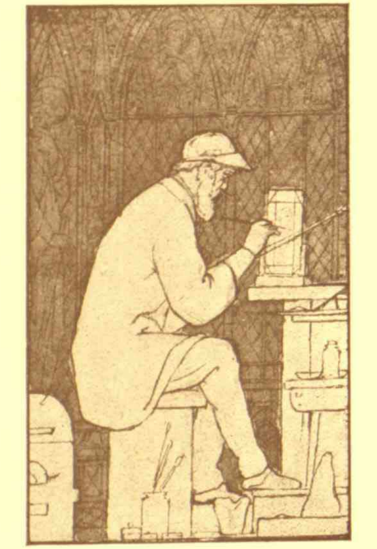
21. Physics and Astronomy
Students
Left portion of "trial panel"



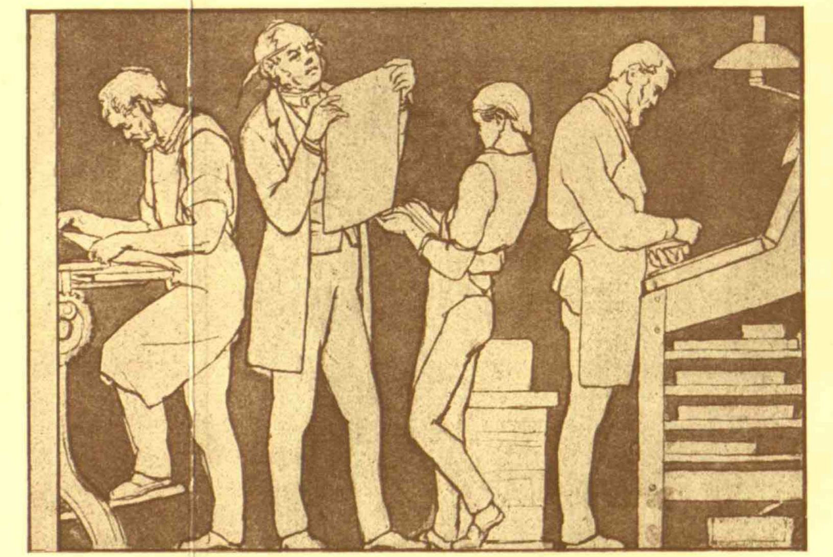
20. Physics and Astronomy
Shepherds
Right portion of "trial panel"



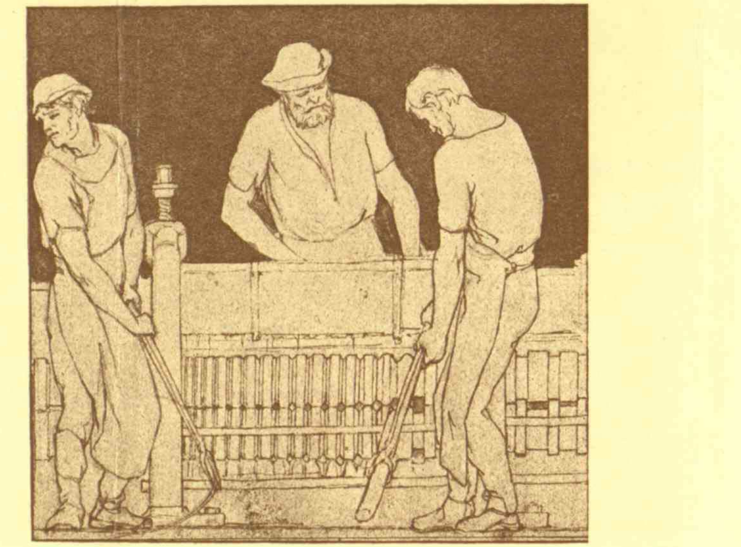
19. Modelling



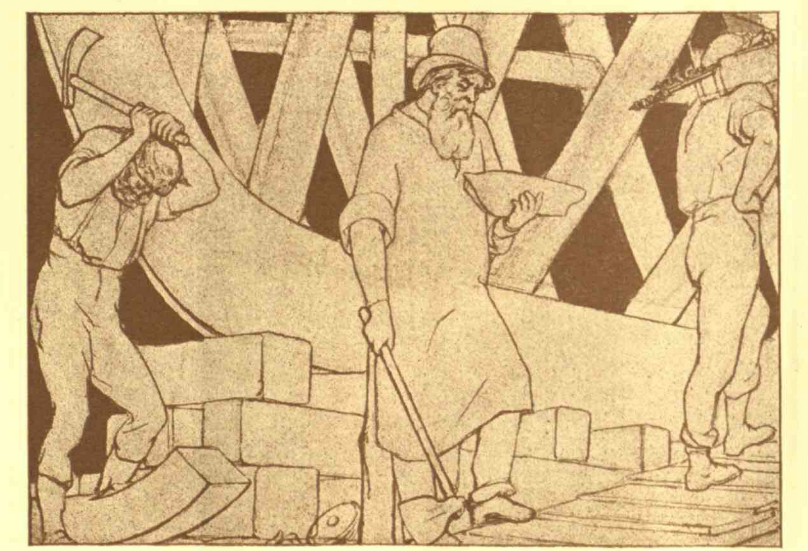
18. Glass Painting



17. Printing

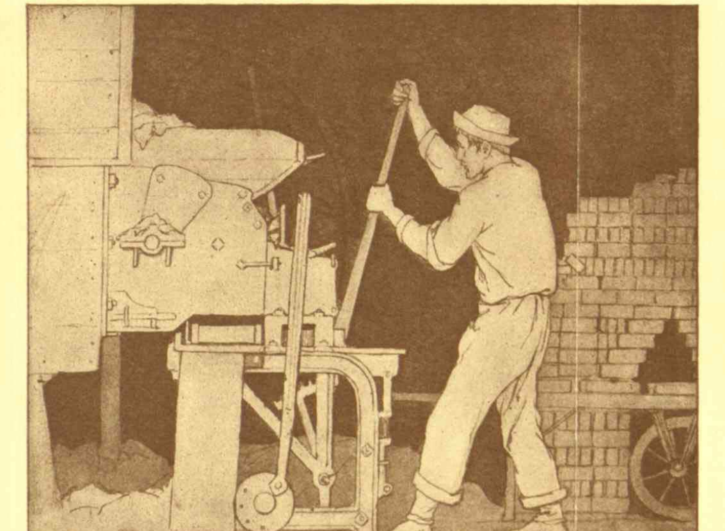


16. Rolling Wire



15. Shipbuilding

14. Glass-blowing



13. Brick-making

12. Navigation

A

NOTE A.

The movement for restoring the old Huntington Hall Frieze received its initiative from twelve men who subscribed for the purchase of the original drawings,—ex-President Crafts, Professor F. W. Chandler, Dean Burton, Secretary Tyler, Registrar Humphreys, Professor John Osborne Sumner, Professor William R. Ware, Professor Frederick Law Olmsted, Mr. John R. Freeman, Mr. James P. Munroe, Mr. H. A. Carson, and Mr. Frank A. Bourne.

NOTE B.

Paul Hermann Nefflen was born Feb. 14, 1833, in Pleidelshein, Ober Amt Marbach, Kingdom of Würtemberg.

When a boy, his father, John Nefflen, moved to Heilbron on the Necker, where he was made mayor. A large gold and silver snuff-box given by some of his people is affectionately dedicated to "Papa Nefflen." He was a man of culture, of marked intellectual power, and quite a prolific author. He was democratic; and his active sympathies with the people and his writings in later years brought him into serious trouble with the government, and incarceration as a political offender. Powerful influence finally procured his release; and he went to France, whence, after remaining a year in Strasburg, in exile, he came to America in 1849. He settled in West Virginia, and became editor of one of the papers. Paul was his favorite son, and was educated at Stuttgart, and received gold and silver medals and other prizes. He began his art studies at eleven years. His father wanted him to become a singer, as he had a fine tenor voice, and gave him teachers; but his heart was so in his art work that he would not sing when his professor came to give him his lessons. At last his father had to give way to him, and afterward became very proud of his son's ability in art.

The king of Würtemberg gave free tuition in the high art school at Stuttgart to the three highest in the art of drawing within the kingdom, once a year; and Paul Nefflen was one of these. The king also allowed them to copy paintings in his private gallery, the only condition being that the copies must be either larger or smaller.

The art students were also obliged to go into the medical college and dissect, that they might become perfectly familiar with the anatomy of the human body. They also had to draw from the antique. This thorough training, though severe, served him well, and in later years particularly, when he often assisted doctors by making colored drawings of their operations. He also painted portraits of dead persons to appear as when living.

Paul Nefflen came to New York at his father's request in 1851. He remained quite a long time, and intended to settle permanently; but unexpected circumstances took him to Boston. While decorating the Odd Fellows' Hall there, his friend, William Schultz, fell from the scaffold, and received mortal injuries. Mr. Nefflen was summoned to complete his work, and also executed another very beautiful original group, which he called "Charity." Mr. Nefflen had been working for almost a year on a large and very elaborate pen-and-ink drawing, illustrating Schiller's "Song of the Bell." This was placed on raffle, and the sum realized (one thousand dollars) he presented to the widow. Mr. Charles Copeland, a well-known confectioner on Tremont Street, drew the winning number.

Mr. Nefflen made many portraits in oil, water color, pastel, crayon, India ink, but figures were his specialty; and he was very versatile in his art, painting animals, flowers, landscapes,

and marine views. He did a great deal of work for Mr. Masury and Mr. Whipple, old photographers of Boston.

He was married June 1, 1864, in Boston to a sister of Miss Mary Cary, the actress, the youngest daughter of Mr. Isaac Cary.

His studio was in the old Studio Building on Tremont Street. Many church pictures he painted, and figures for stained-glass windows. Christian Herter, of Herter Brothers, New York, was a great friend of his; and, when he erected the big organ in Music Hall in Boston, Mr. Nefflen was selected to paint the heads on the pipes. He was also with J. Philip Rinn. In 1869 he moved to Syracuse, N.Y., where he did many kinds of work. One very large water-color painting of the "Holy Grail" was greatly admired, and was bought by Mr. Pierre Lorillard, for whom he did a great amount of work. The following extracts about it are from the Syracuse *Journal:* "Tennyson's poem has met with so true an interpretation at the hands of one of our fellow-citizens that, in justice to him, we feel impelled to give some notice to the community. The scene so ably pictured by the artist-poet is described in the account given by the nun to Percival. The moment seized is when 'down the long beam stole the Holy Grail.' The nun, half risen from her pallet, roused by the more than mortal music, reaches forth her hand to grasp or touch the holy cup. Surrounding the Holy Grail are angelic forms floating in clouds; and some of these produce the music arousing the nun, while others read from a scroll the names of those who have been blessed with the vision, and add another thereto, who, by faith, may be 'healed of all her ills.' The light of the beams, thrown through the holy cup, throws a shower of rosy flakes upon the wall, and back of the nun a halo which might well surround her pure head. There is a lightness, purity of fancy and expression, a faithfulness in detail, softness of touch and grace, thrown into this picture which stamp the artist, Paul Nefflen, a genius, and one who would have graced the times when holy men devoted themselves to illustrations of the Scriptures with pictures no purer than this."

From Syracuse he returned to Boston to paint the frieze in the Massachusetts Institute of Technology. Professor William R. Ware was the one who had authority to select the artist who should paint the frieze. There were many who applied; but, when they found that they must make a trial panel on the subject of "Physics and Astronomy," they gave up the attempt. Mr. Nefflen had always been a great student and lover of science, so he became at once interested, and painted a panel (reproduced with the sketches accompanying this article) to show Professor Ware his capability for executing the frieze. The frieze was painted in 1871, and consumed about ten months. The artist had to do his work in the bitterest winter weather, with no windows in the hall, as it was in an unfinished condition, the only fire being a tiny stove with just heat enough to keep his colors warm. He contracted a severe cold, and after the completion of the hall he was ill many weeks.

One of the next large works he did was in the Custom-house in Baltimore. The figures were colossal, as they were up seventy-five feet or more on the walls. These paintings were on the fresh, wet-mortared walls. A clipping about them at the time from a Baltimore paper says: "In the rotunda of the Custom-house in Baltimore the architects, Messrs. A. B. Mullet & John Gibson, have built in the centre a square of Champlain marble, which will contain the desks of the officers, and from which all may behold the gorgeous gallery of paintings. From the circular gallery we get a close view of the four allegorical paintings by P. Nefflen."

In the Liederkranz Singing Society's Club-house, New York City, he designed and painted a quaint frieze for the Old German Beer-room, also for the Arion Singing Society's Club-house, a frieze in their small dining-room used by the members. With Mr. George Herzog, of Phila-

delphia, he painted figures in the big Jewish Club (the subject is said to be Harmony) in 42d Street, near Sixth Avenue, New York. He worked for Mr. Herzog more than two years, and during that time painted many beautiful portières and a fine hunting frieze in the dining-room in the home of Mr. Widener, the Philadelphia millionaire; also in the Drexel house there, in the new city hall, and in the Supreme Court-room. There were other friezes done in Philadelphia. On Third Avenue, New York City, he painted a large frieze in Schmenger's restaurant; also a very elaborate frieze in a café near the Produce Exchange. For Dion Boucicault he painted a large set of panels, figures on gold ground, which formed a frieze around his bedroom; also on his bed and other pieces of furniture. For his old friend, ex-Mayor Charles Siedler, a partner of Pierre Lorillard, he painted a whole ceiling on gilded canvas, with palms, flowers, birds, and singing cherubs, for a bedroom.

He died April 29, 1894, after a long illness, suffering from a repetition of the same kind of tumor which, sixteen years before, had caused the loss of his right eye. In spite of and after this loss a great deal of his best work was accomplished. He was indefatigable in his art. Immediately after this loss of his eye he copied a miniature on ivory for Pierre Lorillard of his great-grandfather, which, save for the newness of the ivory, could not be distinguished from the original. He was unpractical and lacking in business ability, and was often imposed upon; but poor or struggling art students found in him a most kind and generous friend, and he always contributed pictures to fairs and charities. He was a great lover of music; and, when he lived in Boston, he belonged to the old Orpheus Glee Club. One of his water colors was selected for exhibition at the Philadelphia Centennial in 1876.

He painted a large, life-size oil painting of the "Birth of Christ," his own conception, for the chapel of the Woman's Prison at South Framingham, Mass., an order from Mrs. Johnston, the superintendent, from whom he had also received many portrait orders while living in Boston.

He drew many beautiful original figure designs in India ink for the American Bank-note Company and the Franklin Bank-note Company, and he also decorated a room in the Capitol at Washington.

NOTE C.

Professor Ware is quoted as saying that the figures in the frieze were the original suggestion for the Technology Seal. A drawing of the seal formerly hung in the Bursar's office at the Institute. This was an India ink drawing, the circular seal being about a foot in diameter. A rough preliminary sketch of this panel, made by Paul Nefflen before he painted the frieze, was reproduced in *The Institute*, Volume I., No. 5, published at the "Tech," February, 1905. This showed a blacksmith at the left and a sailor at the right of the coat-of-arms of the Commonwealth of Massachusetts.

NOTE D.

Following is a memorandum, dated Jan. 11, 1872, of contributors on account of fresco work in Huntington Hall: M. C. Warren, Samuel Downer, Sewall, Day & Co., John Cummings, J. W. Edmunds, Bay State Brick Company, Bay State Iron Company, J. L. Little, E. B. Bigelow, M. D. Ross, C. H. Dalton. The amounts were generally $100 each, $1,000 in all from the contributors named.

NOTE E.

MURAL DECORATION BIBLIOGRAPHY. This is a list of convenient reference books on the general subject of mural decoration, as at present practised:—

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Cortissoz, *Century*, November, 1895, page 111 (illustrated).
Crowninshield, "Mural Painting," Boston, 1887.
Fenollosa, "Mural Painting in the Boston Public Library," 1896.
Fowler, "Mural Painting," *Architectural Review*, July, 1901, page 510 (illustrated).
Havard, "L'Œuvre de Galland," Paris, 1895.
Jackson, "Mural Painting," London, 1904.
King, "American Mural Painting," Boston, 1902.
Low, "Mural Painting: Modern Possibilities," *Brush and Pencil*, December, 1902, page 161.
Low, "The Mural Paintings in the Pantheon and Hôtel de Ville of Paris," *Scribner's*, December, 1892, Vol. XII., No. 6.
Rhys, "Frederick, Lord Leighton," London, 1900.
South Kensington Museum, "List of Buildings having Mural Decorations," London, 1883.
Sturgis, "Mural Paintings in American Cities, with List of Painters," *Scribner's*, January, 1899, page 125 (illustrated).
United States Library of Congress, Mural Paintings in Color, New York [1902].

NOTE F.

. . . La décoration, à l'Hôtel de Ville, Paris, des treize coupoles abritant la Galerie sur la Cour du Sud.

Galland les acheva durant l'année qui précéda sa mort.

Le problème que Galland avait a résoudre était, en effet, des plus compliqués. On peut difficilement imaginer une surface plus malaisée à orner que la calotte intérieure de ces coupoles. Portant sur quatre pendentifs, elles présentent, sous quelque angle qu'on les contemple, des raccourcis et par conséquent des déformations. En outre, l'artiste n'était pas libre de choisir les sujets qui devaient les meubler. Il devait représenter les *Métiers* qui touchent à l'Architecture et à l'Ameublement. Par conséquent, il ne lui était guère permis de faire intervenir partout la triomphante allégorie.

Impossible, sans tomber dans des répétitions forcées, de figurer toutes ces professions sous l'apparence de belles femmes nues, assises sur les nuages. Aussi prit-il vaillamment son parti, et s'inspirant des *Loges* de Raphaël, avec lesquelles sa succession de coupoles offrait plus d'un point de ressemblance, il inséra, au-dessous de chaque baie, un de ces *métiers* enfermé dans un gracieux cadre, inscrit lui-même dans un riche cartouche surmonté de l'armoirie de la corporation représentée. De cette façon, chaque coupole renferma deux de ces petits tableaux dont les encadrements furent réunis à leur sommet par un cartouche central formant clef de voûte, et portant alternativement les lettres R F et les armoiries de la Ville de Paris.

Les sujets offrent la disposition suivante:—

Art	Industrie
Matière	Science
Jardinier	Potier
Orfèvre	Tapissier
Graveur	Verrier
Peintre	Tailleur de Pierres
Architecte	Maçon
Menuisier	Luthier
Forgeron	Armurier
Sculpteur	Charpentier
Tourneur	Fondeur
Commerce	Agriculture
Navigation	Force

Les quatre sujets situés à chaque extrémité, c'est-à-dire l'*Art*, la *Matière*, l'*Industrie*, la *Science*, d'une part; d'autre part, le *Commerce*, la *Navigation*, l'*Agriculture*, la *Force*, sont personifiés par des figures allégoriques inscrites dans un cercle orné. Dans les autres cartouches, nous venons de le dire, sont représentés les dix-huit *Métiers*, en de petits tableaux mettant en scène de quatre à cinq personnages.

From L'Œuvre de P.-V. Galland par Henry Havard, Paris, Quantin, 1895, page 168.

Frank A. Bourne, '95.

THE IDEALS OF THE INSTITUTE

Of primary importance either to an individual or to an institution in reaching a wise decision in regard to any important course of action is the existence of a correct point of view concerning the more fundamental question of the aims of his life or the purposes of its existence. Without this the marshalling of arguments and the application of the most exact reasoning are of little avail. Of more worth is the judgment of an ordinarily intelligent person who possesses the true ideal than that of the logician or philosopher who has failed to grasp it. For, however clearly the arguments for and against the proposed plan may be understood, there must exist a full appreciation of ultimate aims and purposes, in order that to each of these arguments may be assigned its appropriate weight.

It therefore seems especially desirable at this time, when so many important questions relating to the Institute are pressing for decision, that its educational ideals should be fully discussed. It is, moreover, essential to their fuller realization that they be kept at all times before the minds of the Corporation, Faculty, instructing staff, and students. For three reasons, even though many of the considerations to be here presented may be trite ones, it has seemed to the writer worth while to attempt to formulate those ideals and to review concisely those educational factors which seem to be of paramount importance in their attainment.

The purpose of the Institute, broadly expressed, is: first, to give its students such a training as will enable them to attain the highest success in their professional careers as engineers, architects, or chemists; and, second, to educate them so broadly and liberally that they may possess varied sources of enjoyment, and may be fitted to fulfil their domestic, social, and public duties as parents, gentlemen, and citizens. It aims to combine a technological with a cultural education,—to make professional leaders, who at the same time are broad-minded men. It must do this as perfectly as pos-

sible under certain conditions and limitations, the most important of which at the present time are, that, for the great mass of its students, only four years' time is available, and that their previous preparation, especially on the side of mental development, is seriously inadequate.

There are no doubt those who will contend, *a priori*, that the realization in any measure of such an ideal is hopeless, and, *a posteriori*, that forty years' trial has fully demonstrated the complete futility of the experiment,—who will claim, consequently, that the attempt should be abandoned, and that the Institute should resolve itself into a professional school for college graduates. To this view the generally recognized success of technological education and the increasing demand for it are sufficient answers. Yet the criticism of leaders of industry and of technological graduates themselves, and our own appreciation of the serious deficiencies in the average student, fully demonstrate that the solution of the problem thus far attained has been an incomplete and imperfect one, and warn us that reforms in our system of instruction and a further development of other than purely professional interests in our students are imperative. It is one of the purposes of this article, while fully recognizing the degree of success already attained and the superiority in many respects of the educational methods of technological schools to those of classical colleges, to emphasize the need of full consideration of certain defects in the present method of instruction, and to urge fuller recognition of the importance of the development of the student life of the Institute on other sides than the purely professional one.

The phases of this educational problem which seem to the writer to deserve especial consideration may be classed under five heads: the development (1) of a rational basis of knowledge, (2) of mental power, (3) of a healthy physique, (4) of social adaptability, (5) of broad cultural interests and high ideals.

1. In the matter of knowledge it is the belief of the writer that the results at present attained are often far from satisfactory. In place of a thorough drill upon the few fundamental principles of science, far too much time is given to the presentation of a vast

array of facts which it is impossible for the student to digest and to retain. Not only does this involve a great waste of time and effort, but it necessarily carries with it an insufficient appreciation of principles. In almost every large division of physical or mathematical science there are a few concepts and principles, often not more than five or six in number, a thorough knowledge of which is of more value than that of all the other isolated phenomena, to the description of which ten times as much time may be devoted. Yet in how many cases are those fundamentals so thoroughly emphasized by frequent iteration and constant application to specific cases as to make them really useful, for practical purposes to the student? It is one of the serious defects of the system of presentation of a subject by lectures that it is almost impossible to give an effective emphasis to fundamental principles and to secure a thorough drill in them. The Institute has already gone far in replacing or supplementing the traditional lecture system by recitation and laboratory work, but there is opportunity for further development in the same direction. Incidentally it may be remarked that studying abroad often seems to have in this respect a harmful influence upon our young instructors by causing them to introduce in their own work the antiquated and inefficient lecture system prevailing in foreign universities, and by causing them entirely to ignore, as is so often done abroad, the question of the receptivity of the students whom they think they are teaching. Another defect in some of the Institute instruction is that the laboratory courses are not sufficiently correlated with the class-room work, the two being often quite distinct courses under different instructors, devoted to different sides of the subject, so that, instead of supplementing the lecture course in driving home the important principles, the laboratory work adds another group of facts to be mastered. A further consideration, usually recognized, though sometimes not acted upon, is that, on the technical side, practice should not be extended beyond the point required to give a reasonable mastery of technique and of the art of experimentation. Carried beyond this point, instruction in special methods, however important they may be, is a comparatively trivial element in

professional education. Finally, reference should be made to the division of the student's attention among too many subjects in the same term, whereby proper concentration of mind on any one subject is made difficult,—a defect in the curriculum which is receiving the attention of the Faculty, and one which, at least in the last two years of the course, can to a large extent be remedied.

The removal of these difficulties in the way of the acquirement of the knowledge of most worth will not only promote that end itself, but will set free much time which is greatly needed for the development of those other faculties and activities which are discussed in the following paragraphs.

2. The abstract principle is very generally recognized in education that the development of mental power far exceeds in importance the mere acquirement of knowledge. Yet in actual practice this principle is too often lost sight of. Owing to the feeling that the Institute will be subjected to criticism if it sends out graduates without knowledge of this or that specific branch of the subject or this or that process or method, the curriculum becomes overcrowded with special courses, and the courses themselves become overcrowded with a mass of details which the student must memorize. This difficulty will not be remedied until instructors completely disregard the superficial criticism that Institute graduates do not know some common fact of technical importance, and realize that in the end well-developed mental power, supplemented by a thorough knowledge of fundamental principles, will completely silence such criticism. In order that this power may be developed and originality fostered, it is necessary that our courses of instruction, both in the class-room and laboratory, be made to consist, to a much greater extent, in the independent solution of problems new to the student and in the execution of minor researches. From the laboratory work especially must be excluded to a greater extent the execution of measurements under explicit directions and with guaranteed apparatus and materials, and there-for must be substituted quantitative investigations for which a method has to be devised from which sources of error must be eliminated. Correspondingly, the examinations given should not involve much

memorizing, but rather a thorough understanding of the fundamentals of the subject, which can be tested only by thinking processes. Their purpose should be not to demonstrate the possession of detailed knowledge, but rather to show whether the power exists of applying principles to the solution of new problems. In place of the old dictum, "Knowledge is power," let the motto of the Institute be: *power is the test of real knowledge*; and, in judging the fitness of any student for its degree, let the question at issue be, not what does he know? but *what can he do?*

3. Of fundamental importance, both to the attainment of a successful professional career and of a happy life, is the third condition mentioned above,—the maintenance of perfect health and the acquirements of habits which will insure its continuance in afterlife. While there have been striking cases in which sick men have accomplished wonderful results, owing to the possession of enormous energy and will power, yet the great decrease in productiveness, especially of those who are engaged in mental labor, owing to imperfect health, is so well known as to need no discussion. Yet, here again, the abstract recognition of the principle is frequently not accompanied by a corresponding practice. Especially is it necessary to combat the sentiment that the obligations of technological schools toward their students lie only on the intellectual side. With the development of opportunities which, it is hoped, may result from the establishment of an athletic field and the erection of the Walker Memorial Gymnasium, it would, in the opinion of the writer, be well to make it one of the Institute requirements that every student take a sufficient amount of regular exercise, preferably in connection with games and *intra*-scholastic contests, in such a way as he may himself choose. This is not a matter which is to be regarded as secondary to the attainment of high scholarship, but as one of the primary conditions which must be first fulfilled. The Institute, as it has been the pioneer in certain methods of education, so also should be the pioneer in the development of a rational system of athletics, which, it would seem, can scarcely have anything in common with the prevailing practice of college athletics. The system must not be one which draws into

athletics only a few men already possessing the highest physical development, but rather it must be one that provides exercise appropriate to their strength for those who are least capable of competing, and who are especially likely, on that account, to neglect entirely the establishment and maintenance of the conditions of health. Encouraging progress is already being made in this direction, as is shown by the large number of our students, who, according to the report of the Dean, are now taking part in track athletics and athletic sports.

4. The development of social adaptability—of ease, cordiality, and *savoir-faire* in dealing with men—is also generally recognized as one of the most important conditions of success, and is one of the respects in which Institute graduates are often regarded as seriously deficient. It is a trite remark to say that these faculties are often of more real value to the engineer than professional attainment. The Institute should not, therefore, consider irrelevant to its work the creation of the conditions by which these social qualities may be acquired. The practicable method of promoting it seems to be to secure more intimate relations between the students themselves, not so much in connection with their professional work as in connection with their pleasures and outside interests. This closer contact, it would seem, might be brought about most effectively in the way favored by President Pritchett, by the establishment of student houses in each of which a small number of students may live and eat together, and for whose maintenance they may be in the main responsible, just as is now the case in the fraternity houses, which already make suitable provision for the social life of a not inconsiderable proportion of Institute students. Social qualities may also be developed by an increase in the number and membership of the societies or clubs devoted to professional or other interests. The natural growth of these has, however, been so rapid at the Institute within the past ten years that it is not necessary to urge their importance, except upon individual students who may be neglecting opportunities of this kind essential to their proper development. This discussion, indeed, must not be closed without adding a warning against the danger of excess in this direction.

Thus it is generally recognized by those familiar with technological education that professional efficiency would be seriously impaired if the social surroundings were those of ordinary college life. The Institute must therefore develop a social life adapted to its own conditions,—one which is economical of time by combining social opportunities with the domestic life and with the professional, cultural, and athletic pursuits of the students, while excluding mere loafing and frivolous or objectionable forms of recreation.

5. Another generally recognized deficiency in many of the graduates of technological schools is a lack of appreciation of those varied interests of life, outside their professions, which constitute culture, which lead to the creation of a true point of view, and which open new channels of enjoyment. The Institute already includes in its curriculum a large proportion of culture studies. In fact, it is not too much to say that nearly one-half of the work required in its engineering courses is of this character. For, though often obscured by educational traditions, it is, nevertheless, a fact recognized by all who have a due appreciation of the relation of scientific knowledge and methods of thought to the conduct of life that the general courses in chemistry, physics, mathematics, and drawing, which constitute rather more than half of the first two years' work at the Institute, form a no less essential part of a broad cultural education than the studies in language, literature, history, and economics, to which, however, even at the Institute, four hundred and seventy-five one-hour exercises and seven hundred and fifty hours of outside reading are devoted. Yet it must be admitted that, largely owing to the attitude in which these subjects are approached by the students,—an attitude which arises in some cases from lack of previous contact with cultivated society and, in part, from the earnestness of devotion to the professional work,—this large proportion of liberal studies in too many cases fails to produce the desired effect. It is, therefore, important to consider what more can be done to secure better results in this direction. The introduction of a larger amount of the same kind of instruction would probably be relatively ineffective; and, at any rate, it is impracticable, owing to the pressing demands of professional subjects. Good results

may be hoped for rather through the introduction of new plans which appeal more directly to the interest of the student or in which the individual can take a more direct part. Thus, in order to secure a greater interest in current political and social questions, it would seem desirable that at frequent intervals, say twice a month, the student body should be addressed by the President of the Institute or by other prominent men in the country upon such questions. The formation of debating clubs would be a most valuable aid, not only in this direction, but also in developing confidence and skill in public speaking. A better appreciation of nature and of the broad aspects of science might be produced by occasional scientific lectures, describing the interesting physiographic features of the earth, giving an account of recent important discoveries or of the life of eminent scientists, or dealing with such general subjects as cosmical evolution or the origin of species. Similar means might be adopted for increasing the interest in literature, art, and the humanitarian sciences. It would be far from a waste of time if, on every Friday evening, some such lecture were given which the students were expected to attend, the school work on Saturday being so arranged as to consist only of subjects requiring no previous preparation. The Walker Memorial Gymnasium will form a most appropriate centre for all such meetings, but they can, of course, in the mean time be otherwise provided for.

These, then, are the educational ideals for which the Institute should strive, and some of the specific ways in which their attainment may be directly promoted. A discussion of the less closely related but more fundamental questions of organization, environment, term of study, and teaching efficiency, lies beyond the scope of this article. Yet, in closing, the writer wishes merely to refer to some of the questions of this kind which seem to him to deserve careful consideration. Upon the side of organization it seems desirable that means be adopted, on the one hand, for securing more direct contact and co-operation between the Corporation and the Faculty, which might be done, for example, through the formation of an advisory council, consisting of representatives of both bodies, as was recommended in this REVIEW (Volume V., page

470) some years ago by Professor Holman; and, on the other, for developing a better department organization, which will enable the head of each department to devote his attention rather to educational problems than to administrative details, and which will give to the younger Faculty members a larger measure of independent responsibility and a more authoritative voice in the decision of departmental questions,—a result which might be accomlished through the formation of Department Councils, presided over by a chairman who should be responsible, in a general way, for the administration of the department, though not burdened with its details, who should take the initiative in bringing educational and administrative questions before the Council, and who should submit its recommendations rather than his own to the President and Executive Committee and to the Faculty. Attention should also be given to the matter of increasing the time of study, either by continuing the regular work into June with readjustment of the school terms or by requiring attendance without extra fees at summer schools devoted largely to the acquirement of technique by continuous work in the laboratories, shops, and drawing-rooms. Care would have to be taken, however, that such additional time did not create a severer strain upon the students: it must rather serve to relieve the pressure produced by the purely technical demands of professional work, and enable more time to be devoted to original problems and to those other hygienic, social, and intellectual pursuits which have been discussed in this article. An extension of the term of study by offering attractive and valuable fifth-year courses leading to the S.M. degree, to which the more specialized technical subjects now given in the undergraduate courses might well be transferred, or which might be devoted to some new side of the profession, should also be considered, especially in view of the success that has already attended such graduate courses in the Departments of Architecture and of Naval Architecture. Finally, the important question as to ways of increasing the quality and efficiency of our instructors must not be neglected. The pressing need of increase in salary so as to secure and retain the best men in teaching work, and to enable them to devote their

whole energy to it and to their own mental development, has perhaps of late been sufficiently emphasized. But free time must also be provided for research work, and it must be generally understood that promotion and increase of salary will depend upon accomplishment in this direction as much as upon teaching ability. A vast amount of good would probably result, too, from more discussion of methods of teaching among the younger instructors and from friendly criticism of the work of individuals by those in charge; and to this end intimate contact and active co-operation between them and the professors in the same line of teaching should be maintained for a number of years.

The consideration of all these possibilities of future development, coupled with the conviction based upon its past success that the Institute has within itself and through the support of its aims by the community the power to effect their realization, justifies the hope that it may, indeed, attain in the fullest sense the position predicted for it by one of its devoted friends,—that of a university resting upon the natural sciences as foundation stones.

A. A. Noyes, '86.

REPORT OF THE COMMISSION ON ADDITIONAL WATER SUPPLY OF THE CITY OF NEW YORK, MADE TO THE HON. ROBERT GRIER MONROE BY PROFESSOR WILLIAM H. BURR, MR. RUDOLPH HERING, AND MR. JOHN R. FREEMAN

The old saying that "large bodies move slowly" has been well illustrated by the manner in which the city of New York has treated its public water supply. When the Croton system was projected, it was felt that the city need have no anxiety as to its water supply for many years in the future; but that system is not yet fully constructed, the new Croton Dam has only just been completed, the distributing reservoir at Jerome Park is not yet finished. Meanwhile the city has grown rapidly, consolidation with Brooklyn and several outlying communities has taken place, and the consumption of water has rapidly increased. The new boroughs brought in to the city growing communities scantily provided with water resources. Thus at the present time the city, taken as a whole, finds its annual consumption practically up to the limit of its resources, with almost no margin of safety to provide against a dry period. The cry of water-famine, however, has been sounded so many times without any visible sign of it that many of the citizens have begun to think it is a cry of "Wolf." The danger is a real one, however, and is bound to be brought home to the people in a most distressing manner as soon as an extended dry period occurs; and according to the laws of the distribution of rainfall such a drought is now overdue. Procrastination in securing a new supply has not been wholly due to the inertia of the great body politic, but partly to political conditions which have caused radical changes of administration and prevented the executive continuity necessary to the carrying out of any undertaking of so great a magnitude as that of a new water supply, and partly to some uncertainty as to the best course

to pursue in providing for the future; for the city has available a number of excellent sources of water supply.

Whatever doubt on this point may have existed in the past has now been overcome. The investigations made by the Commission on Additional Water Supply during the year 1903 served to clear the atmosphere and show plainly the path which must be trod. The voluminous report of this commission, recently made public, is the subject of this review. In order that its conclusions may be the better understood, however, it is necessary to go back a little, take a glance at the condition of the city's water, and recount briefly some of the previous investigations which have been made.

The city of New York, since its consolidation with Brooklyn and some of the outlying districts in 1898, has consisted of five boroughs, known as Manhattan, Bronx, Brooklyn, Queens and Richmond. The first two lie between the Hudson River and the East River, and formed the old city of New York. The next two are on Long Island. The last comprises the whole of Staten Island. The total population at the present time is estimated as nearly four million. The area of the city is 327 square miles.

There are three principal systems of water supply in New York: the Croton system, the Bronx system, and the Ridgewood system.

The Borough of Manhattan is supplied from the Croton River, which has a watershed of 338 square miles, with its centre about forty miles north of the city. The supply is a surface water developed by means of eight large artificial storage reservoirs and several natural lakes. From the lowest of these reservoirs two aqueducts lead to the city. The present distribution reservoirs are at Central Park, but some of the water is pumped to a high service reservoir. Another distribution reservoir is being constructed at Jerome Park. The consumption of Croton water is about 300 million gallons per day.

The Borough of Bronx is supplied in part from the Croton system, and in part from the Bronx and Byram Rivers. The latter have a combined watershed of about twenty square miles, located adjacent to and south-east of the Croton watershed. A pipe line conducts

water from the lowest of the three reservoirs, at Kensico, to a distributing reservoir at Williams Bridge. The quantity of water supplied by this system is about 20 million gallons per day.

The Borough of Brooklyn is supplied from Long Island. An aqueduct extends out along the southern shore of the island for about forty miles, and intercepts fifteen small streams flowing in a southerly direction. On these streams there are a number of "supply ponds," from which the water runs into the aqueduct by gravity. The general character of the soil on Long Island is very sandy, and the surface water supply is supplemented by water derived from the ground by means of driven wells. The ground water supply forms about 40 per cent. of the total. The total amount of water supplied from the Ridgewood system is about 100 million gallons per day.

The Boroughs of Queens and Richmond are supplied by a number of separate supplies, chiefly driven wells. Many of them are owned by private companies. There are also separate supplies for various parts of Brooklyn and the Bronx.

All considered, there are eighty-two distinct sources of water supply in the city, if we consider each driven well station and each separate reservoir as a distinct source. The total consumption in round numbers at present is about 400 million gallons per day, and of this 83 per cent. is surface water and 17 per cent. ground water. In Brooklyn a large part of the surface water and ground water is mixed before delivery, so that it may be said that 68 per cent. of the total supply of the city is surface water alone, 9 per cent. ground water alone, and 23 per cent. is surface and ground water mixed. Filtration is used only to a limited extent. On the Brooklyn system there are two mechanical filters and two slow sand filters which purify the water from polluted ponds.

The general quality of the various water supplies of New York City is fairly satisfactory from a sanitary standpoint. The city has an average typhoid fever death-rate of only about 20 per 100,000 inhabitants, which compares favorably with most of the large cities of the United States. The various supplies, however, are widely different in quality. Thus the Croton water is somewhat colored

and slightly turbid, and often possesses objectionable odors due to microscopic organisms. It is a good boiler water, and generally satisfactory for industrial uses. The population on the Croton watershed is bound to increase in the near future, and filtration will soon be necessary. The water supplied to Brooklyn, also, possesses at times unsatisfactory physical qualities. Not only are the odors bad at times, but the water contains large amounts of sulphates, nitrates, and chlorides because of the infiltration of sea water into some of the driven wells which are near the coast. A number of the smaller supplies are very hard, and some of them are almost brackish.

As is the case with most growing cities, the supply of water of our great American metropolis has scarcely kept up with the demand, but conditions differ in different parts of the city. Some of the smaller outlying districts have a sufficient supply for a number of years to come, while in some parts of the Borough of the Bronx there has been already a water famine, and large numbers of people have been practically without water for considerable lengths of time. Brooklyn has been more than once on the verge of a water famine, and the conditions in that Borough are serious.

Even before consolidation the city of Brooklyn had realized its need of water, and in 1896 reports were made by Mr. I. M. de Varona, the chief engineer, and Mr. William E. Worthen, C. E., on the possibility of obtaining a further supply from Long Island or from the Ramapo and Ten Mile River watersheds on the mainland. The people of Manhattan and in the other boroughs had also come to realize their need. It was very evident that the consumption in Manhattan and the Bronx was fast approaching the safe limit of yield of the Croton and Bronx systems. When the consolidation took place in 1898, it was generally conceded by the officials in charge that the time had come for obtaining a new supply of water capable of meeting the needs of the entire city.

In August, 1899, the water commissioner, Hon. William B. Dalton, presented to the Board of Public Improvements a startling report in which he recommended that a contract be made with the Ramapo Water Company for furnishing a supply of 200 million

gallons of water a day, delivered at an elevation of 300 feet above tide level. The supply was to be taken from the Ramapo River and other streams in the southern part of the Catskill Mountains. It was to be available in five years, and a contract was to be made that the company should furnish the city with water for forty years at a cost of $70 per million gallons. This is what was known as the "Ramapo Steal." The report raised a storm of protest, but so carefully had the preliminary negotiations been conducted that the plan would have been carried into effect, had it not been for the vigorous efforts made by certain of the opponents of the scheme, chief of whom was the comptroller, Hon. Bird S. Coler. Fortunately for the city, the plan was defeated.

The comptroller was wise enough to see that to battle successfully with the corporate interests the most effective weapons would be cold facts. He wanted to know first of all the actual conditions of the Croton water system, and what its capabilities really were. He therefore engaged Mr. John R. Freeman, C. E., to report on the general subject. Mr. Freeman attacked this problem with characteristic energy, and the outcome was a voluminous report issued in March, 1900, recommending the Ten Mile and Housatonic Rivers as sources of supply. This report, with its 587 closely printed pages and with its numerous maps and illustrations, will stand as one of the classics in water-works literature.*

Shortly after Mr. Freeman's investigation was begun, the Merchants' Association of New York decided to make an independent study of the whole subject, and late in the autumn of 1899 appointed a committee of prominent professional and business men to study the water supply question, not only from an engineering point of view, but from that of public policy, legislation, insurance, and finance. The work was done by sub-committees. The Engineering Committee was composed of a number of well-known civil engineers, the organization of the details being under the immediate direction of Messrs. Thomas C. Clark, Rudolph Hering, and E. P. North. Mr. J. J. R. Croes made a study of the distribution system and the amount of water wasted, Mr. James R. Fuertes in-

*See Vol. II. of the Review, p. 388.

vestigated the available sources of supply, Mr. George W. Rafter reported on the practicability of obtaining a water supply from the Adirondacks, Mr. Foster Crowell collected data in connection with the possible use of an auxiliary supply of salt water, and Mr. L. B. Ward took up the subject of the pumping stations of the city. The results of all these labors were published in a report of 627 pages in August, 1900. This report covered a somewhat wider field than did Mr. Freeman's, and proved a valuable supplement to it. It served to emphasize the great need of the city for more water, but the supply of water which was thought best suited for the purpose was different from the one which Mr. Freeman had recommended. The plan proposed by Mr. Fuertes was to construct a great reservoir on the Wallkill River, a stream which flows into the Hudson from the west, some distance south of the Catskill Mountains.

Thus the two reports were not wholly harmonious in their recommendations. They served their purpose, however, in defeating the Ramapo project, which was so objectionable upon financial grounds; and the question of water supply dropped for a time out of public notice, though it was not entirely lost to sight.

The chief engineer of the New York Water Department, Mr. George W. Birdsall, had for some time looked with favor upon the Catskills as the most favorable region for obtaining a satisfactory water supply, and he succeeded in securing an appropriation to make surveys of that region with this object in view. The studies were never completed, but enough was done to show the practicability of utilizing the waters of Esopus Creek by constructing an immense storage reservoir upon it. Before Mr. Birdsall's investigations were completed, the Tammany administration was defeated at the polls, and the Hon. Seth Low became mayor of the city.

One of the first important subjects taken up by the Reform Administration was that of a new supply of water for the city. In view of the conflicting suggestions which had been made as to the best source to be taken, it was thought best not to take any radical steps until the question had been thoroughly investigated by the highest authorities. A commission of engineers, known as the Commission on Additional Water Supply of New York City, was therefore ap-

pointed by the mayor to act with the water commissioner, Hon. Robert Grier Monroe. The engineers selected for this purpose were Professor William H. Burr, Mr. Rudolph Hering, and Mr. John R. Freeman. The last two gentlemen had been already identified with the previous investigations. A liberal appropriation was provided, and the investigations were begun in January of 1903.

The instructions which were issued to this Commission on Dec. 16, 1902, were to make a thorough and exhaustive investigation of the following subjects connected with an additional supply of water for the city of New York, namely:—

1. The quickest and best method of reducing water waste.
2. The quality of the present water supply.
3. The pressures in the distribution system.
4. The methods of distribution from the standpoint of fire protection.
5. The probable future consumption of water in each borough.
6. The most available source of supply sufficient to meet the future needs of the city—including studies of costs, quality of the water, yield of the sources, time required to complete the works—and the formulation of general plans and specifications.
7. The feasibility of developing a temporary and supplementary supply of water at a moderate cost pending the completion of the permanent future supply.

Few commissions of investigation have ever worked under broader instructions; and, when the size of the city is taken into account, the amount of work necessary to be done in order to make such a comprehensive report is seen to be enormous. In order that the ground might be fully covered, the work of the Commission was organized under six different departments, each of which was in charge of a department engineer. These different departments were as follows:—

1. Aqueduct and Reservoir Department. E. G. Hopson, Engineer.
2. Catskill Department. Walter H. Sears, Engineer.
3. Filtration Department. William B. Fuller, Engineer.
4. Chemical and Biological Department. George C. Whipple, Engineer.
5. Long Island Department. Walter E. Spear, Engineer.
6. Pumping Department. William J. Sando, Engineer.

The study of water waste in the city had already been begun by the chief engineer of the Water Department, Mr. Nicholas S. Hill, Jr., and, therefore, no separate department was organized to cover this work. Of the six department engineers, four were graduates of the Massachusetts Institute of Technology, while the other two had been previously connected with the water works of the city of Boston.

The work of the several departments was conducted independently, each engineer reporting at the end of each week directly to the Commission. The various lines of work, however, were co-ordinated by frequent conferences of the department engineers in the office of the Commission. At the conclusion of the investigation the department engineers rendered final reports in detail, which are published as appendices to the report of the Commission, and which fill the greater part of the volume. The report of the Commission itself is condensed into seventy-three pages. It takes up the broad aspects of the entire problem, and gives only the final results and conclusions of the investigation. These general conclusions may be summarized as follows:—

As to water waste, it was found that the leakage from the street mains is much less than has been heretofore supposed, and that no extensive renewals of the mains are necessary. The chief sources of waste are attributed to leaking plumbing fixtures, to the overflow of tanks not provided with ball-cocks, to defective plumbing designs, to abandoned service pipes, etc. House to house inspections in typical districts in the Boroughs of Manhattan and the Bronx indicated that the loss from leaking and defective plumbing fixtures probably exceeds 15 per cent. of the total supply, or upwards of 40 million gallons a day. The Commission recommends the extension of the meter system and the ownership and maintenance of meters by the city. It was found that the greatest possible saving that could be made by reducing the waste of water and decreasing its extravagant use would not more than offset the natural increase in demand due to the growth of the city. It was found, also, that the present average daily draft from the Croton supply is so close to its limit of capacity that the natural growth of the city and the

natural increase in the legitimate per capita water consumption during the five years or so that must elapse before an additional supply can be ready for delivery may bring the city to the verge of a water famine should years of low rainfall occur, unless effective means are taken to restrict waste and lessen extravagance. In this respect the findings of the Commission corroborate and emphasize the reports of previous investigations, and show the great need which the city has for an additional water supply.

The population of New York City is increasing so rapidly that by the year 1930, if not sooner, it is reasonable to expect a total population of about seven million people, which is practically double the present population. In view of the fact that the per capita consumption of water generally increases with the population it is estimated that, in order to fulfil future requirements, the new works must be capable of providing 150 gallons per capita daily for the additional population, or, in round numbers, 500 million gallons per day. This supply need not be added all at once, but it will be required at the end of about twenty-five years; and it is this requirement which governs the capacity of new aqueducts to be built.

In considering the various sources of water supply available for the use of the city, the Commission was strictly limited by its instructions to streams which lie within the State of New York, inasmuch as legal opinion had shown the advisability of avoiding all sources of supply which might involve questions of the rights of different states to the water. Thus, the Housatonic River project was ruled out of consideration because its watershed lies partly within the States of Connecticut and Massachusetts, while the Ramapo and Wallkill projects were ruled out because their watersheds lie partly within New Jersey. The sources of supply left for consideration were divided into natural groups, as follows: first, the streams which flow into the Hudson River below Albany from the east; second, the streams which flow into the Hudson River below Albany from the west; third, the upper tributaries of the Hudson River lying north of Albany, the most important of these being the Adirondack streams; fourth, the Hudson River itself, taken at some point near Kingston and filtered before being used; fifth, the streams and

ground water on Long Island serviceable for the Boroughs of Brooklyn and Queens. All the available sources were studied in great detail both as to the quality of the water and to the general feasibility and cost of works necessary for utilizing them and bringing the water to the city.

The general plan recommended was the construction of storage reservoirs on three of the streams which enter the Hudson River from the east—namely, the Fishkill Creek, Wappinger Creek, and the Roelif Jansen Kill—and a great storage reservoir on the Esopus Creek, which flows into the Hudson River from the west, and which drains the south-easterly slopes of the Catskill Mountains. It was pointed out, moreover, that further extensions might be made in the distant future by utilizing the waters of Rondout, Schoharie, and Catskill Creeks; and it was shown that the Hudson River itself might also in the distant future be utilized after filtration.

After considering various plans and the possibility of using two aqueducts instead of one for bringing the water from these reservoirs to the city, the Commission recommended the immediate construction of a single aqueduct capable of discharging 500 million gallons per day, when running eight-tenths full. Studies of the distribution system showed plainly that the greatest need of the future will be in the higher portions of the city, as these sections are growing most rapidly. This fact, taken with the need of additional fire protection, caused the Commission to recommend that the aqueduct be located at a high level, and so designed as to bring the water into a suitable reservoir at the northerly limits of the city, with its high water surface at an elevation of not less than 295 feet above mean high tide, and having a capacity of 2,000 million gallons. The site which was selected for this reservoir is the summit known as Hill View in Westchester County, adjacent to the city limits, about three miles north of Jerome Park reservoir.

It was estimated that by constructing reservoirs on the above-mentioned streams the supply of the city might be increased by 592 million gallons daily,—60 million from the Fishkill, 255 million from the Esopus, 98 million from the Rondout, 67 million from the Wappinger, and 112 million from the Jansen Kill. The general

plan was to develop the Fishkill watershed first by means of two reservoirs at Stormville and Billings, and to filter the water through sand filters located at Stormville. From this point the aqueduct was to carry the water to the Hill View reservoir above mentioned, a distance of about forty-nine miles. Above the Stormville filter the aqueduct was to extend north-westerly across the Hudson to a great reservoir known as the Ashokan Reservoir on the Esopus Creek, crossing the river near Rondout. This portion of the aqueduct was to have a capacity of 400 million gallons daily. With the construction of these works the city would have an increased supply of 315 million gallons daily. When further enlargement became necessary, it was proposed to build other aqueducts and canals, in order to utilize the waters of Wappinger Creek and the Jansen Kill.

The quality of the water recommended for the new supply was found to be excellent. The population on the watersheds is sparse, and the few sources of pollution which exist are such that they may be readily taken care of. Nevertheless, the Commission believed that the standard of quality demanded for our public water supplies is rising so rapidly that they included a filtration plant as a part of the general project. This was to be located near the Stormville reservoir, and was to be of the slow sand type. The quality of the water to be obtained from the Catskill region was found to be much superior to that of the water which could be derived from the streams flowing into the Hudson from the east side. The difference lay chiefly in the hardness. On account of the presence of limestone in the region east of the Hudson, the water in the streams there was very hard,—two or three times as hard as the water of the Croton River,—while the water in the Catskill region was extremely soft,—the hardness being only about one-half that of the Croton supply.

The total cost of the projected works for providing a high level supply of 500 million gallons of water per day was estimated as $111,478,000. Of this, however, only $39,000,000 would need to be spent at first to provide an additional supply of 60 million gallons daily. A further expenditure of $21,000,000 would add 320 million gallons to the daily supply. Figures of this magnitude are difficult of comprehension, but a careful study of the subject will show that

they are not excessive, considering the enormous problem to be solved.

In some respects the projects for providing an additional water supply which were studied and rejected are more interesting to the engineer than those which were adopted. Thus the use of the Hudson River involved studies of the character of the water, the possibilities of filtration, the design of what would have been the greatest pumping station in the world, and other similar matters. The possibility of using the streams of the Adirondacks involved interesting problems in hydrography. The absurdity of some of the schemes which had been proposed as sources of supply for the city (such, for example, as Lake George, Lake Champlain, the St. Lawrence River, etc.) were made evident without much study. The studies made on Long Island to ascertain the possibility of increasing the supply of Brooklyn by the use of the underground water were most interesting and complete. Indeed, in many ways the negative findings of the Commission may prove to be of more importance than the positive results; for the undesirable sources of supply have been relegated at last to the background, and not only the ideas of the engineers, but popular opinion is beginning to crystallize around the Catskill region as the most desirable source of the future water supply of New York City.

So much for the general subject. Those who are especially concerned in hydraulic and sanitary engineering will probably find more to interest them in the appendices of the report than in the report itself. These cover nearly nine hundred pages, and are illustrated with numerous maps, diagrams, and tables.

Mr. E. G. Hopson's report, which comprises Appendices I. and III., describes in detail the studies which were necessary to locate properly the aqueduct from the Stormville filter to the city. The location of the aqueduct is shown in plan and profile, and typical sections of it at various points are described. The detailed studies which were made of the dams for the various reservoirs are equally interesting.

The report of Mr. Walter H. Sears, department engineer, of the Catskills, forming Appendix II., describes the project for constructing the great Ashokan Reservoir on the Esopus River. Appendix IV. gives a study of the

probable yield of the various watersheds, conducted jointly by Mr. Hopson and Mr. Sears.

Appendix V. gives the report of the filtration department, in charge of Mr. William B. Fuller. This report describes the investigations carried on, and includes a preliminary draft of specifications, showing the manner of constructing the proposed filter plant at Stormville. It is accompanied by thirteen plates, showing the general plan of the filter.

Appendix VI. describes the work done by the Department of Chemistry and Biology. The headquarters of the department was at Mount Prospect Laboratory, Brooklyn, the regular laboratory of the Water Department. The field-work, however, had its centre at Poughkeepsie, where a branch laboratory was located under the direction of Mr. George A. Johnson. This field-work covered a very wide area. For many months, samples of water were collected daily by a large corps of special collectors at thirty-four stations, scattered over the eastern part of New York State from the Adirondacks to the lower Hudson. These daily samples, which represented all the important streams, were sent to Poughkeepsie for analysis. Observations were also made upon the stage of the river, meteorological conditions, and other factors which might influence the character of the samples and show the quality of the water. When the work of the Commission was first undertaken, the project of using the Hudson River by filtration appeared to be a most promising one, and this led to some extensive studies to determine the quality of the water of the river with reference to its sedimentation and filtration.

In addition to the data bearing upon the quality of the various streams recommended by the Commission, Appendix VI. contains the results of a number of separate investigations of subjects incidental to the main project. The most important of these were a normal chlorine map of the State of New York, prepared by Mr. D. D. Jackson, the chief chemist of the Water Department, a method of estimating the probable average annual hardness of the upland water, and discussion of the value of soft water to the city of New York.* Another important investigation conducted by the Depart-

*Starting with a few simple experiments showing the amount of soap which people ordinarily use in washing their hands, calculations were made showing the costs to the citizens of being obliged to use a hard water rather than a soft water. To one who has never investigated the subject the figures seem almost incredible. It was found, for instance, that to double the hardness of the present water would cost the people of the Borough of Manhattan $270,000 a year for soap; and it was found further that, when capitalized, the difference in value to the city between the soft water of the Catskills and the hard water of the streams east of the Hudson River amounted to several million dollars.

ment of Chemistry and Biology was a study of soil physics carried on in co-operation with the Long Island Department. This work had for its object the investigation of the moisture which is held in the soil by capillarity and the laws which govern its flow. This work was in charge of Mr. Langdon Pearse. All things considered, however, it is probable that the most valuable part of Appendix VI. is that which shows the quality of the present water supplies of the city. While the laboratory at Mount Prospect has been in operation since 1897, no regular reports from there have ever been published; and the present report gives a summary of the work which has been done during the past six years, so far as it relates to the quality of the various supplies.

One of the most interesting reports of the volume is that of Mr. Walter E. Spear, the engineer of the Long Island Department, contained in Appendix VII. His investigations were conducted to ascertain the general relations between the rainfall, evaporation, percolation, surface run-off, and the underground flow, as they affect the use of the ground water on Long Island as a source of supply for the Borough of Brooklyn. The investigations included studies of tides, stream flows, the fluctuations in the height of the underground water, etc. The diagrams showing the cross sections of the island and illustrating the movement of the ground water are of especial interest, and are compiled with such care that they will probably stand as the highest authority on the subject for many years to come. Some of the methods used in the investigations were quite unique, among the most novel features being the use of an electrical apparatus for determining the rate of flow of the ground water and the use of the "residual mass curve" in showing the relation between rainfall and the height of the ground water over long periods of time. In connection with these hydrographic studies conducted by Mr. Spear, the character of the soil on the island was carefully investigated by Professor W. O. Crosby, of the Institute, and co-operative studies were made by representatives of the United States Geological Survey.

Appendix VIII. gives the report of Mr. Will J. Sando, who had charge of the Department of Pumping. Had the Hudson River project been adopted, the investigations of this department would have been extensive; but, when this project was given up, the energy of the department was turned to the existing pumping plants of the city and the means of improving their efficiency. The report contains many valuable tables, showing the cost of pumping at the various water-works stations of New York as well as in other cities of the United States.

Appendix IX. describes the results of the water-waste investigation, carried on by Edward S. Cole, C.E., under the general direction of Mr. N. S. Hill, the chief engineer of the Department of Water Supply, Gas, and Electricity. It was impossible to study the question of water waste over the entire city of New York, but certain typical districts were selected, and studied very carefully by means of the pitometer. The differences found in the use of water between the down-town office districts and the up-town tenement-house districts were most striking. In addition to the practical results obtained, the report contains many facts of interest in connection with the use of the pitometer as a means of measuring the quantity of water flowing through pipes.

Appendix X. shows the organization of the force employed by the Commission, and it will be a matter of interest to Institute men to learn that the graduates of the M. I. T. played such an important part in this great work. Of the thirty-seven men listed higher than the grade of assistant engineer, more than one-half were graduates of the Institute of Technology. Nor does this limit the number of Tech men, as many graduates and undergraduates were employed in subordinate positions.

SUPPLEMENTARY REPORT

Shortly after the presentation of the above report, Tammany again came into power in New York City. The New York State legislature in 1904 passed an act which prohibited the use of the waters of Fishkill and Wappinger Creek by the city. In November, 1904, George W. Birdsall, acting chief engineer of the Water Department, presented a report describing a project for obtaining water derived from the Catskills. His project differed in many respects from that of the Commission. In January, 1905, a report on the filtration of the Croton water was made to the Aqueduct Commissioners by Messrs. Hazen & Whipple, consulting engineers.

In view of the changed conditions brought about by the action of the legislature, Mayor George B. McClellan reassembled the Commission on Additional Water Supply, and instructed them to examine the report of the acting chief engineer, and make further recommendations as to the future policy of the city in the matter of its water supply. On Jan. 16, 1905, the Commission presented

three supplementary reports, one on the best means of securing an additional water supply from the Catskill Mountain region, one upon the advisability of the immediate construction of additional reservoirs in the Croton watershed, and one on the advisability of suspending work on the easterly division of Jerome Park Reservoir and of filtering the Croton water. These reports were published in the City Record of Feb. 3, 1905.

GEORGE C. WHIPPLE, '89.

INSTRUCTION IN DICTATION AND CORRESPONDENCE FOR FOURTH-YEAR STUDENTS.

Instruction in letter-writing in connection with the first-year course in English is at least as old as my knowledge of work at the Institute. In addition to the usual directions for headings and the like, this training has from time to time taken special forms, according to the opportunity of the moment. On one occasion, criticism was offered on the replies, or lack of them, to a general invitation extended to the first-year class. Two or three years ago, at the suggestion of the President, a letter of application for summer employment was written. This was made, as far as possible, to depend upon the writer's actual circumstances. It proved a valuable exercise; and it has since become, I believe, a regular part of the work in most first-year sections.

In addition to this customary training the attempt was made last term, in some of the first-year sections, to teach the dictation of short letters. Brief notes were given to the class, the substance of the desired reply was indicated, and students were asked to rise and dictate the answer as though to a stenographer. The sort of note used is illustrated in the one printed below. It is supposed to be addressed to the student dictating.

84 Federal Street, Salem, Mass.,
Dec. 15, 1904.

Dear Mr. X——, Can you tell me whether Tech gives correspondence courses? I am doing office work here, and have some time to spare. Would wish to take up machine drawing. I apply to you, as you will probably remember me, and I did not know to whom to write at the Institute.

Very truly yours,

Requests for information about the Institute were taken as the only available common subject. For each note the substance for several replies was indicated, beginning with the simplest form.

In the above case the series may be supposed to be as follows: (1) simple negative; (2) negative with reference to school for industrial foremen and sending of Institute literature; (3) the preceding note, with suitable acknowledgment of the personal reference at the end of the original letter.

From the point of view of practice the subject of dictation is somewhat remote from the first-year student's immediate interests, though not more so, perhaps, than any other literary art. From the point of view of theory no formal training could be more profitable. The language of theoretically good dictation is terse, dignified, and precise. It so far differs from our slovenly colloquialism as almost to seem like another tongue. Then, too, it pleases not alone the cultivated, but the untrained ear. The right phrase, once heard, commends itself without the fatal necessity, so frequent in other writing, of an appeal to authority or taste. These considerations gave the attempt to teach dictation, even to first-year students, no little attractiveness. Again, like oral composition, which was being tried in some sections at the time when this experiment was first made, dictation has the obvious advantage of enabling the student for once to work under the teacher's eye. The result was as foreseen. The students accepted the exercise politely, not wholly without symptoms of being bored, but still with the air of feeling on firmer ground than usual.

Another development of the work in letter writing for first-year students has usually met with not only polite, but animated attention. This is the longer letter, treated primarily as a study of the character and needs of the writer. The letter given below has been used in this way as an exercise in the adaptation of written work to a particular audience. It is supposed to be addressed, like that above, to the individual student.

I wish to apply to you for a little advice regarding my son and his prospects. You know that he has been fitting for college in the local high school here, and expected to enter in a year more. Lately, however, he has made rather a mess of his studies, and has failed conspicuously in his Latin and Greek. Indeed, he tells me that he has taken such a dislike to the dead

languages that he strongly desires not to be obliged to go on with his college course. This decision is naturally a great disappointment to me, for, as you know, I have always desired him to get a college training, the more so as I have seen the need of it in my own work. As I cannot believe that my son is naturally idle or vicious, I must conclude him right in saying that loss of interest is the cause of failure in his studies. His mother believes that misunderstanding on the part of his teachers has had something to do with it, and thinks him of too sensitive a nature to do his best work where he is not appreciated. But that view is partly due, no doubt, to a mother's partiality. At all events, we do not feel like forcing him to master subjects which he so strongly dislikes.

If he does not go to college, a scientific school presents itself as the next alternative; and Technology seems most available. I do not know that my son has shown a fondness for any special branch of science, but he has certainly had more luck with mathematics than with other things. Knowing that you have recently entered the Institute, I thought you might be able to give me some information. Do you think my son would be able to fall on his feet there, and choose a course, even though his ideas of what he wants are at present quite hazy? Do you think he could find stimulus enough to get him once more into the habit of work?

In the treatment of this letter in the class-room, first came a discussion, with sometimes a written sketch, of the character of the father. Then a reply was composed, not necessarily dictated this time, each student following his judgment. These replies sometimes attempted to state disagreeable truths without offense, and sometimes leaned toward the advice which the correspondent seemed to want, and was thus likely to accept. They were written in most cases with imagination and feeling.

The more letter-writing and dictation have separated themselves from the general problem of English training, the more desirable it has seemed that some such work should be introduced into the second term of the fourth year. In the present state of social correspondence the principles of good form in letter-writing may easily be forgotten in three years. Signs are not lacking among any fourth-year class that these principles have been forgotten, especially in connection with written applications for employment. In any

case, practice in dictation can do no harm. Men go out into large firms nowadays, and do business at long range. Even in subordinate positions they need at times clerical assistance. If a man learns nothing but to say, "I have your note of February 9," it may save his credit, and incidentally his pride, when he appears before the stenographer to dictate his first note.

Something of this plan it has been possible to put into effect the present term. Through the kindness of Professors Talbot and Clifford, two sections of about twenty men each have been formed from the fourth-year classes in chemistry and in electrical engineering. The students elected the work, and have been given a course of five class-room exercises without outside preparation. The aim has been, so far as time permitted, to cover three points: (1) the writing and criticism of an application for employment; (2) the dictation of short notes; and (3) the study of longer letters, to illustrate how frequently it is necessary to read between the lines. When possible, material has been drawn from subjects connected with the student's professional course. This latter point is, in effect, of secondary consequence, for one can teach only the form, not the substance, of letters; but familiar material assists the illusion of reality. The presence of a stenographer, while desirable, perhaps, toward the close of a course of fifteen exercises, can well be dispensed with through all these early steps.

The general form of the letter of application for employment may be judged by the following circular note, suggested by Professor Talbot, and used for the students in chemistry:—

SIMMONS PORTLAND CEMENT COMPANY,
SIMMONS, PA., May 10, 1904.

MR. ——, MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Boston, Mass.:

Dear Sir,—I desire to secure the services of a young man who has had sufficient training in chemistry to fit him for the position of assistant to the manager of our Portland cement works. He will be expected to make himself familiar with the processes employed in the works by becoming a laborer in each department, beginning with a period of service in the chemical laboratory as assistant to the chemist. The length of this training will,

of course, depend upon the ability of the individual to master the essential features of the work in each department. It will demand energy, patience, and perseverance; but it is our purpose, in connection with the establishment of a new plant, to offer a position of wide responsibility, if the ability to assume such a position has been demonstrated. The salary offered at the start is forty dollars per month, which will be increased as rapidly as is justified by the circumstances of the case.

Your name has been sent to me among others by Professor Talbot, of the Massachusetts Institute of Technology, as worthy of favorable consideration. If you desire to apply for this position, please write me at once, stating your age, place of birth, general health, the extent of your chemical training, and what experience, if any, you have had in work in other than chemical lines. In short, tell me any facts about yourself which will enable me to judge of your fitness for the position spoken of above.

Very truly yours,

The replies to this note were interesting. Some of those who elected the course had held clerical positions, some were unable even to distinguish *shall* from *will*. There was among the majority a curious survival of old forms,—the commercial travellers' English, so dear to the generation preceding ours. "Your favor of —— at hand, and contents noted. In reply would say ——." The writers, like young men generally in presence of their elders, tried to hide themselves behind conventions. Their letters, with one or two exceptions, were all alike, and related entirely to externals. On the whole, the exercise justified itself, if it did no more than present two ideas,—that common usage is not the only standard of expression, and that a man who wishes to impress others must individualize himself in their eyes.

The character of the other work given for fourth-year men—dictation and the study of longer letters—is perhaps sufficiently indicated in what I have said of the course in first-year English. In dictation special attention was paid to problems which recur, as letters of introduction and of recommendation, the methods of indicating an enclosure, the various forms of opening, conventional polite phrases, the requirements relating to the use of files, and so on.

The value of work of this sort, properly given, must, I think,

be evident. I should wish to see it left, indeed, as an elective subject, but offered to all fourth-year men in their second term. Even the schools which profess to prepare for office work are doing too little of it. The business colleges declare that they lack the time, and the schools that train young women for clerical positions have not apparently as yet formulated a method. In the case at present under discussion little can be done, of course, in the line of actual teaching. In a course of fifteen exercises, or even of ten, more could be accomplished. The teacher of English should be given a chance —which he would highly appreciate—to review professional correspondence. In this there need be no fear of the prying eye; for, as Emerson says somewhere,—I quote from memory,—"A chemist may reveal his most precious secrets to a carpenter with no fear of detection." Better still, the professional department should evolve a teacher of composite character, interested in both form and substance. But these things are with the future. With the modest allowance of five hours asked for and obtained this term, it has been possible only to indicate the main principles of good form. The better-prepared students appear to have fallen into the spirit of the work. Others will have gained all that was expected, and ample to justify the expense of time, if only one or two choice phrases stick in their memories as lasting ideals of form.

A. T. Robinson.

THOMAS MESSINGER DROWN, LL.D.

The sudden death on Nov. 16, 1904, of Thomas Messinger Drown, then president of Lehigh University, caused a profound shock, both to his immediate associates and colleagues and to the host of his friends throughout the country. There have come from these friends such an abundance of tribute to the beauty of his character, such recognition of the value of his attainments, and such heartfelt utterances of a realization of personal bereavement that it is not easy to avoid a sense of incompetency in attempting adequately to reproduce, in any concise way, this wealth of appreciation and regard. A few of these friends will be allowed to speak for themselves and for the many, and no apology is made for the personal note which runs through the following pages.

Thomas M. Drown was born in Philadelphia on the nineteenth day of March, 1842. His parents were William Appleton Drown, a prominent merchant of Philadelphia and a native of Portsmouth, N.H., and Mary (Peirce) Drown, of Philadelphia, her parents being also of New England origin. Their children were William Appleton, James Peirce, and Thomas Messinger Drown, of whom Thomas was the youngest. He spent his boyhood in Philadelphia, and attended the public schools of that city, where his scholarship was recognized by the almost yearly award of medals or certificates of high standing. He was graduated from the Philadelphia High School in 1859.

While still a pupil in these schools, he had evinced a keen interest in chemical science, and had inaugurated a laboratory, first in his father's house, and later, after banishment from the house for easily understood causes, in a small building on his father's property. With his love for chemical science well established, he entered the University of Pennsylvania in the same year, where he continued the study of chemistry in its medical department, and where he was induced, after much deliberation, to take up also the study of medi-

THOMAS MESSINGER DROWN, LL.D.

cine. This course he completed in 1862, receiving the degree of doctor of medicine, his thesis, which covered 337 written pages, having the title "An Essay on Urological Chemistry." This thesis received the highest commendation at that time, and a brilliant career in medicine was predicted for him.

In therapeutics and surgery, as in other lines of study, his scholarship had been high throughout his course; and he obtained upon graduation a then much-coveted opportunity to take a berth as surgeon on one of the packet steamers plying between Philadelphia and one of the English ports. He made, however, only one round trip in this capacity; and this constituted nearly his entire professional experience as a medical practitioner, as he shortly after became convinced that his preferences were distinctly for a life-work in chemical or metallurgical fields. Yet the brevity of his medical practice by no means measures, or even indicates, the influence of his medical training upon the efficiency of his subsequent services to science and education, as will later appear.

Yielding to his inclination to renew his work in chemistry, Dr. Drown devoted about three years to study, first at the Sheffield Scientific School at New Haven, where he worked with Professors Brush and Johnson, and afterwards at the Lawrence Scientific School at Cambridge, under Professor Wolcott Gibbs. Dr. Gibbs writes that he still has memoranda of work done by Dr. Drown in 1864 upon a new separation of cerium from lanthanum and didymium. He adds: "He soon became a very dexterous worker. His personality was always most attractive. He was a gentleman by nature." The influence of this association with Dr. Gibbs upon his subsequent teaching will be referred to in a later paragraph.

In 1865 Dr. Drown went abroad for study, first at the School of Mines at Freiberg, Saxony, and subsequently at the University at Heidelberg, remaining abroad about three and a half years. In these days of quick ocean passages and rapid interchange of scientific thought and information, it is not easy to understand all that this opportunity to work with the masters of the Old World signified, both because of the indelible impress which it made upon habits of thought and practice, and because of the prestige which attached

to an experience then so much less common than now. To have been a pupil and friend of the great Bunsen is, as is well known, something not to be lightly esteemed, and to this was added, in Dr. Drown's case, a valuable training in metallurgical fields under competent teachers at Freiberg.

It was during this residence abroad that Dr. Drown met Miss Helen Leighton, whom he married in 1869 at her home in England.

After his return to America, in 1869, with a training in chemistry and metallurgy of unusual excellence, Dr. Drown accepted for a short time a position as instructor in metallurgy at the Lawrence Scientific School. This he abandoned in 1870 to return to Philadelphia, where he opened an office and laboratory as analytical and consulting chemist, which he maintained until 1874, when he removed to Easton, Pa., to assume the professorship of chemistry at Lafayette College.

About three years before this, May, 1871, at a meeting at Wilkes-Barre, Pa. of some twenty-two mining engineers and metallurgists, there had been organized the American Institute of Mining Engineers. Dr. Drown was one of this number, and was elected one of the board of managers of the new Institute,—a position which he resigned in 1873 to accept the office of secretary. This office he retained, as a result of successive unanimous re-elections, until 1883, also retaining his position at Lafayette College until 1881. In the years 1873–74 there thus came to him the opportunity to enter a field of great usefulness and influence.

I am much indebted to Dr. R. W. Raymond, the secretary of the American Institute of Mining Engineers, for the privilege of reading, and in part utilizing, the advance manuscript of that portion of an extended biographical notice which he is preparing for the Transactions of the Institute, which deals with this period of Dr. Drown's life.

From the very beginning of his work as a teacher at Lafayette College, Professor Drown adopted those methods which contributed so much to his continued success as a teacher, and which characterized him pre-eminently as one who taught his pupils rather than his subject. His energies were mainly devoted to laboratory rather than class-room instruction; to an attempt to "make chemists"

rather than to express in a formal way his own views upon the various phases of chemistry; and to the stimulation of the faculties of his pupils by teaching them how to criticise intelligently their own work and that of others rather than to permit themselves to accept any analytical procedure as final. In the latter connection he clearly recognized the desirability of exciting the student's interest by intrusting to him the investigation of minor points about which questions arose in the course of his work, these being at first of the simplest types, but gradually increasing in importance and difficulty with the growing capacity of the pupil to deal with them. In this way he developed the spirit of scientific investigation early in the student's career. This procedure was made possible, in part, by the comparative smallness of his classes; and in the later days at the Institute of Technology, when the number of his students increased with rapid strides, he would often say, sometimes with a sigh, that the students who left his laboratory at Lafayette College were "hand-made" chemists, and, as Dr. Raymond says, "Drown's men were universally recognized as intelligent, practical, and skilful chemists, and were in special demand on that account."

The foundations of this admirable practice as a teacher were laid during his association with Professor Gibbs at Harvard (a fact which he always delighted to emphasize); but it is also true that the sound pedagogical principles then acquired were most skilfully applied and adapted to the instruction even of beginners in chemical science through Dr. Drown's own sagacity.

It was at this time, too, that he became intensely interested in the perfection of rapid and accurate methods of analysis with reference to their usefulness in industrial enterprises, notably in metallurgical lines. With this end in view he was constantly setting before his pupils problems dealing with the facility, rapidity, and accuracy of laboratory methods, and was himself at the same time industriously working upon various similar problems. Professor Edward Hart, his successor at Lafayette College, says: "As you know, there was hardly a corner in iron analysis which he did not explore and illuminate. So rapid is progress that some of his work has been lost sight of, but it is there; and it all counted in the present-

day development." This is well corroborated by an examination of the list of his published papers (too long for reproduction here) in the Transactions of the American Institute of Mining Engineers, which include contributions relating to changes in the composition of irons and steels as influenced by the varying conditions of production; papers dealing with the determinations of sulphur, silicon, titanium, phosphorus and aluminum in irons and steels; an important paper on the uses of pulverized zinc in analytical chemistry; and papers upon coal and coke and their analysis. His contributions to the printed discussions of papers presented by other members of the Institute (twenty-two in all, embracing an unusually wide variety of topics) are hardly less important. Dr. Raymond says of these discussions:—

Almost without exception the papers thus discussed by Dr. Drown had been prepared under the stimulus given by his leadership in the investigation of chemical methods; and our volumes contain innumerable papers and discussions (not mentioned above, because he did not personally take part in them) which were likewise due to his initiative and example,—"symposiums" on various branches of analysis and assaying, and criticisms of existing processes as well as recommendations of new ones. It is not too much to say that the movement he then inaugurated has made this department of investigation a characteristic feature of the Transactions of the Institute. Of course, it was not new in scientific literature. Professors and analysts had discussed such topics before. But Drown managed to arouse the interest and co-operation of a class previously content, as a general rule, with the performance of daily routine,—the chemists of metallurgical works, for instance, who had to make, day after day, numerous monotonous analyses of the same sort of material for the same limited commercial purpose, and who might easily drop into the mood of drudgery, and fancy themselves shut out from the wider usefulness and higher reputation of scientific investigation.

Of Dr. Drown's work as secretary of the Institute Dr. Raymond says:—

He accepted this position in 1873 (resigning for that purpose his office as manager), and held it until the middle of 1883, when the pressure of other

duties obliged him to give it up. During those ten years the membership had grown from 22 to about 1,300, and the secretary, besides taking care of the increasing list, the collection of annual dues, the necessary correspondence, and the mailing of volumes, etc., had conceived in 1877, and conducted thereafter, the plan of preliminary publication in pamphlet form, which has been pursued ever since. The system of financial accounts was likewise devised by him. In fact, he fixed so wisely the procedure in every department of the Institute's work that I, as his successor, have done little more than continue on a larger scale the methods established during his administration and, at his suggestion, by the Council of the Institute. . . .

In June, 1879, Pardee Hall, the home of the scientific department of Lafayette College, then containing the office of the secretary and the library and other possessions of the Institute, was destroyed by fire. The conflagration was so sudden and swift that there was not time to save all the valuable contents of the building, and a choice had to be made. Secretary Drown made that choice instantly, generously, and wisely. Realizing that the library of the Institute, consisting mainly of files of technical journals and the proceedings of technical societies received by way of exchange, could probably be replaced if lost, whereas the loss of the records of the Institute itself and the stock of back volumes of its Transactions would be practically irreparable, he decided at once to save these, and let everything else go. Of course, he was surrounded by students eager to assist in the work of salvage. But everybody knows how indiscriminate, and even ludicrous, is the aid rendered by excited individuals on such occasions; and the achievement of the secretary in that tumultuous hour was a wonderful evidence of his quiet, clear-headed executive ability. For he so directed the labors of his young assistants that they rescued from destruction just what he deemed most valuable. When that had been accomplished,—and it was completely accomplished,—there was no time for anything more. Not until that moment did others realize what he had known all the while, that he had deliberately saved for the Institute the invaluable records of its past at the sacrifice of his own professional library, occupying a room in the same building. This sacrifice was to some extent made up to him through the hearty appreciation of his fellow-members, which found substantial expression at a banquet held in connection with the Montreal meeting of the Institute in September, 1879, in the presentation to the secretary of a check for several thousand dollars, contributed by a large number of his grateful colleagues.

In 1883 he was forced to resign the secretaryship of the Institute on account of the pressure of private affairs, and was then unanimously elected an honorary member of the Institute. He was also later elected to the presidency for the year 1897–98.

Professor Henry M. Howe says of Dr. Drown:—

> He left a very deep impression on the metallurgists through his connection with the Institute of Mining Engineers. He moulded this, and set the stamp of his character upon it in its early years so deeply that it has held in great part to the direction which he wisely gave it.

The exacting demands of business affairs, consequent upon the death of his father, caused an interruption for some years of all connection with teaching and to a considerable extent with his professional work. This was resumed, however, in 1885, when he found himself free to accept the proffered professorship of analytical chemistry at the Massachusetts Institute of Technology. To describe the salient features of his work at the Institute would be to recount much of what has already been said of his teaching at Lafayette College, save that with increasing years had come increased insight into character, especially student character, and perhaps an increased sympathy with minds less keen than his own, which made him charitable almost to a fault with the shortcomings of struggling pupils. The larger number of students in his classes forced upon him the adoption of class-room instruction to a degree which was always a source of regret to him, yet he maintained his practice of spending a part of nearly every day in going about the laboratories among his students, encouraging, counseling, and stimulating them to intelligent, critical work. In 1888 he was appointed head of the Chemical Department; and on the death of Professor Lewis M. Norton, in 1893, he also assumed charge of the course of Chemical Engineering. In this capacity he exhibited clear judgment in the extension of the curricula of these courses demanded by changing conditions; and he encouraged the coworkers of all grades in the department by helpful advice, urging the expansion of the work of the individual and promptly recognizing success

and ability by unsolicited recommendations for promotion. In this administrative office, as in his teaching, it was his quick and generous appreciation of all that was good in the work of his associates, combined with the unfailing kindness of his criticism and the recognized breadth of his learning and his culture, which brought willing workers to his side.

In 1886 the legislature of Massachusetts passed an "Act to protect the purity of inland waters," under which the State Board of Health was required to obtain information regarding all of the existing sources of domestic water supply in the State, and to collect information or conduct experiments relating to the purification of sewage by its application to lands.*

The investigations thus provided for were begun in June, 1887. The conduct of the various phases of the chemical work involved was placed in the hands of Dr. Drown, and the water analyses were made for nearly ten years in Room 36 of the Walker Building of the Institute, where Dr. Drown was most ably assisted by Mrs. Ellen H. Richards, the laboratory staff being under her immediate direction. Most of the work upon sewage purification, both experimental and analytical, was carried on at Lawrence, Mass.; and Dr. Drown made almost weekly visits to those laboratories for nearly eight years.

Few men could have been found with such admirable qualifications as were combined in Dr. Drown for this enormous task of testing old and devising new methods of analyses, of systematizing records, and, above all, of giving vitality and worth to the mass of data obtained. His familiarity with large problems and his wide knowledge of men and affairs gained while secretary of the American Institute of Mining Engineers enabled him to co-ordinate and interpret the work of chemists, biologists, and engineers, while his editorial experience was invaluable in the preparation of reports; and to this must be added his acquaintance with chemistry and medicine, his active mind, so fertile and resourceful, and his sane judgment in scientific affairs. To say that no records were allowed to leave the laboratory which were not scrupulously neat and sub-

*This act was amended in 1888 in such a way as to less rigidly delimit the scope of the work.

jected to repeated verification, or that weeks were spent in studying possible points of weakness in analytical methods before their adoption, is, of course, to mention important details; but the far-reaching influence of the pioneer work done by Dr. Drown and his assistants in these years cannot yet be estimated, since it is recognized as authoritative by the scientific world, and has become both the inspiration and the model for many other investigations of the same sort, which would not have been possible at this time except for the painstaking thoroughness with which the first comprehensive and continued study of a large number of water supplies was organized and executed.

In 1890 the first extended report of this work was issued by the State Board of Health of Massachusetts in two large volumes, covering the work of two years, and including, on the side of the examination of water supplies alone, the analysis of about 4,750 samples. This number reached 10,000 on Feb. 15, 1893, and over 18,000 in 1897, when the work was transferred to the new laboratories at the State House. The analysis of the ten thousandth sample was signalized by a delightful dinner at the house of Mrs. Richards, which was made the occasion for the reunion of all who had had a share in the analytical work in the course of the five and one-half years.

At the end of the first two years, as noted above, no less than nine definite contributions to the then existing knowledge of the sanitary chemistry of domestic water supplies are enumerated in the report. A more gratifying output for two years of work in a field which, so far as an undertaking of this magnitude is concerned was largely untried, could hardly be desired.

The result of this extensive and systematic examination of such a large number of waters of the State which is probably most generally known to the public is the "Map of Normal Chlorine" of Massachusetts, showing the content of chlorine in the unpolluted waters, varying from 0.08 parts in 100,000 in the Berkshires to more than 2 parts on the Cape. The "iso-chlor" lines thus show the normal composition of a surface water in any given locality, and an increase of chlorine over the normal is a measure of the con-

tamination of the water supply due to surrounding population. This was a marked achievement in itself, and has been of invaluable assistance to chemists, engineers, and sanitarians. Similar maps have since been prepared for other States, this one serving as a model.

With reference to the published accounts of this extensive work in sanitary fields, Mr. H. W. Clark, chemist for the State Board of Health, says:—

> Looking over the articles that have been left in print in the reports of the Board with his [Dr. Drown's] name attached, only one who has known thoroughly how much really belongs to him to which his name is not attached can understand how small a part of all his work for us is represented by them; and yet this list in its way is a remarkable one. In the special report of the Board for 1890 upon "Examination of Water Supplies," there is an article by him upon the "Interpretation of the Chemical Analysis of Water." I think that no one conversant with the subject can deny that it was the first thoroughly scientific and yet common-sense exposition of this matter,—a classic when published, and certainly of the utmost value even to-day.

A second article on the same subject was published in the Report of 1892, and these alone constitute one of the most noteworthy features of his contributions to chemical science. Other papers, many of them scarcely less important, are as follows: in 1891, "Amount of Dissolved Oxygen Contained in Waters of Ponds and Reservoirs at Different Depths," "The Effect of the Aëration of Natural Waters"; in 1892, "The Amount of Dissolved Oxygen Contained in the Waters of Ponds and Reservoirs at Different Depths in Winter under the Ice," and "The Mineral Contents of Some Natural Waters in Massachusetts"; in 1893, "The Amount and Character of Organic Matter in Soils and its Bearing on Storage of Water in Reservoirs"; in 1894, "The Composition of the Water of Deep Wells in Boston and Vicinity."

After his removal from Boston, in 1895, to accept the presidency of Lehigh University, he was appointed "consulting chemist," and visited the State House laboratories six or seven times each year.

In 1898, on the death of Dr. C. P. Worcester, he was asked to assume the same advisory relation to the Department of Food and Drug Inspection. Both Mr. Clark and Mr. Leach, chemists in the State House laboratories, pay warm tributes to his helpfulness as counsellor and kindly critic, and to the thoroughness with which, even amid his administrative duties as college president, he kept abreast with the latest achievements in sanitary investigations.

In the memorial adopted by the State Board of Health are found these words:—

> He appreciated the importance to the community of the work which this Board was endeavoring to perform, and entered into his part of it with an earnestness and devotion that supported and encouraged every one associated with him.
>
> His great knowledge, his appreciation of its limitations, his clear thinking, his justness, his kindness, his sweetness, rendered work with him a delight, and have contributed ennobling characteristics to the work of the Board.

While in Boston, Dr. Drown was a member of the Thursday Evening, St. Botolph, and Eastern Yacht Clubs, a Fellow of the American Academy of Arts and Sciences, and a member of the Boston Society of Civil Engineers and the New England Water Works Association. At the time of his death he was also a member of a number of American and foreign scientific societies and of numerous educational organizations. He was also a member of the Century Club of New York and of the international committee appointed to investigate and present standard methods for the analysis of irons and steels.

In the spring of 1895, yielding to appeals of friends which had been made before, but then set aside, Dr. Drown accepted the presidency of Lehigh University at South Bethlehem, Pa., continuing, however, his connection with the Institute until June of that year. In making this decision to abandon the chemical field he was doubtless largely influenced by the desire, so warmly expressed by his friend Mr. Eckley B. Coxe, one of the trustees of the university, that he should enter this new domain, and work side by side with him

in the interests of Lehigh. The death of Mr. Coxe, which occurred after his acceptance of the presidency, but before the date of the inauguration ceremonies on June 19, 1895, brought, therefore, a sad and keen disappointment. Dr. Drown did not, however, allow this severe blow to diminish his efforts for the welfare of the university; and other friends, rallying to his assistance, remedied, as far as possible, the single unpropitious factor in his new work, the then limited financial resources of the university.

As was said in speaking of his service to the State Board of Health of Massachusetts, he entered upon this new work with exceptional qualifications. He was again among the friends of earlier years. Many of these were captains of industry ready to receive the engineers who should be trained under his direction. He had given much thought, while in Boston, to the sort of training which such young men should have, and his interest in and sympathy with young men was exceptionally strong. It is perhaps too early to measure adequately all that his administration has meant, and will mean, to the university; but it is certain that it at least has been characterized by an increase in attendance, by a broadening of the curriculum in such a way as to recognize the importance of general and culture studies in the education of engineers, and by a perfection of the details of the administrative offices of the university. These are, however, but the exterior indications of success. There has been another and deeper benefit derived by the students to whose interests he gave, not only his time and energies while at his office, but to whom, with the hearty co-operation of Mrs. Drown, he threw open his beautiful home on all occasions of rejoicing, while on Sunday afternoons he regularly visited those detained in the hospital by illness.

During the years of his presidency he took a broad interest in educational matters, particularly in the relations of the secondary schools to the university, and delivered a number of addresses upon educational topics. Some of the more important of his published writings are: "The Educational Value of Engineering Studies," in 1895; "Reports of the National Municipal League Committee on Instruction in Municipal Government in American Educational

Institutions," in 1901 and 1902; and "From High School to College," in 1903.

He received the honorary degree of Doctor of Laws from Columbia University in June, 1895.

The following quotation from a report of a sermon in the Bethlehem *Times* of Nov. 21, 1904, delivered by the Rev. B. S. Sanderson of that city, will serve to show that the work of President Drown did not lack appreciation outside the university circle. He says, in part:—

> While himself a specialist along a particular line, his whole nine years at Lehigh were characterized by a catholic sympathy for each of its several schools,—a sympathy so sincere that it embraced with entire interest even those studies most remote from his own, departments the practical utility of which the average technicalist does not always acknowledge. The ideal and practical were soberly related in his vision, and his voice was ever insistent upon such a combination of them as would broaden and enlarge the educational facilities of Lehigh. . . .
>
> His untimely departure has brought sorrow to a wider circle than the academic body of which he was the head. This whole community has genuine reason to regret his death and to feel his taking away as a personal loss. The college necessarily absorbed the most of his time and engaged the best of his faculties. But, despite the activities of his professional life, he was a distinct factor for good in the community where was his home. Busy man that he was, he never was so engrossed that he could not find the time for the claims citizenship and neighborhood made upon him. I have yet to learn of the cause looking to the physical, intellectual, or moral uplift of this community in which Dr. Drown was not genuinely interested.

It was from such activities as these that, yielding to the advice of specialists, Dr. Drown stepped aside to submit to an operation to remove an obstruction of the intestine not then thought to be of serious import. The operation was performed at St. Luke's Hospital at South Bethlehem on the 11th of November. He never fully rallied from its effects, and died in the early morning of the 16th.

The foregoing pages have been poorly written indeed if they have not pictured in some measure the unusual strength, beauty,

and gentleness of Dr. Drown's character, and the still more unusual association of such gentleness, culture, and exquisite refinement with exceptional firmness of purpose and capacity for prompt accomplishment of his ideals as an executive and administrator, as well as a scientist of marked ability. Of so many men possessing the marked gentleness and unselfishness which characterized Dr. Drown, it would have to be said that these traits stood in the way of the attainment of results. Of him, however, it may truly be said that, while these traits of character, combined with his exceptional charm of voice and bearing, his inexhaustible fund of anecdote, and his keen sense of humor, inspired admiration and frequently affection on the part of those with whom he came in contact, yet he equally compelled the respect of his friends and associates because of his attainments both in the domain of science and in the educational field.

Of the expressions which have come to me from those who may be ranked as friends of longest standing there is room for only one here, that of Dr. Raymond:—

> In the combination of gentleness with power, candor with conviction, wide culture with special and accurate knowledge, generosity with judgment, genius with industry, sensitiveness with patience, the keen judgment with the pure heart, the power to win love with the power to command esteem, the wisdom of this world with the wisdom of the world to come, this, our dear friend, stood conspicuous among men. Would there were more like him for us to love, to admire, to imitate, and gratefully to mourn!

HENRY P. TALBOT, '85.

THE ALUMNI AT COMMENCEMENT

The Tech Reunion of 1904, marking as it did an epoch in the Institute's history, was of greatest value in awakening, in undergraduates and alumni alike, a broader and stronger Technology spirit. This spirit had existed since the beginning of the Institute, but never had it been given such expression, never had there been such cordial intermingling of classes, and never had there been a time when, from the "oldest living graduate" to the youngest member, the alumni had so fully realized that without regard to class or course they are one and all members of the brotherhood of Tech men. This linking together of the alumni in a strong, homogeneous body is of inestimable value to the Institute and to the men themselves. Especially is it needed at the present time, when so many problems vital to the Institute's future demand the careful thought and concerted action of all interests.

That the impetus of last year's reunion may not be lost, and that opportunity may be given the alumni to meet again in the spirit of comradeship, it is proposed to hold this year, as well as every year, a suitable alumni observance of the graduation season. By no means is it intended to repeat each year, in all its details, the Tech Reunion of 1904. Such gatherings should be held only at intervals of five or ten years, when men at a distance will make unusual effort to be present. Certain features of that reunion, however, may well bear yearly repetition, notably the class dinners, the class spreads on the afternoon of graduation day, and the general participation that evening of alumni and undergraduates, with their friends, in the "Tech Night Pop Concert."

Already plans are well advanced for this year's observance of commencement. The matter received the consideration of the Association of Class Secretaries at its March meeting, when it was found that a considerable number of classes were planning to hold class reunions and dinners at this time. A committee appointed by that Association has charge of the alumni arrangements for the

event; and the undergraduates will co-operate with the alumni, particularly in connection with the Pop Concert. This committee consists of Herbert N. Dawes, '93 (chairman), Charles C. Pierce, '86, Howard L. Coburn, '87, William W. Crosby, '93, Charles F. Park, '92, Leo W. Pickert, '93, J. Arnold Rockwell, '96, Walter Humphreys, '97, Charles-Edward A. Winslow, '98, Richard Wastcoat, 1900, Bernard Blum, '04, William D. B. Motter, Jr., '05, Robert H. W. Lord, '05, Stewart C. Coey, '06, Frank S. McGregor, '07, William B. Given, Jr., '08.

Commencement comes this year on Tuesday, the 6th of June. While the complete program of the day's observance is yet to be announced, it is known that many and probably most of the classes will hold spreads and dinners at this time; and it is expected that every class from '68 to '08, forty-one classes in all, will join in making the "Tech Night Pop Concert" an event worthy of the Institute's traditions. Technology men will do their part in establishing permanently the custom so happily inaugurated at the First Tech Reunion of a general observance of commencement by the alumni.

GENERAL INSTITUTE NEWS

CORPORATION NOTES

At the stated meeting of the Corporation, March 8, no business was transacted, but special meetings were called for March 24 and March 30 for the purpose of discussing the Plan of Alliance, drawn up by the Conference Committee (consisting of President Pritchett and Professor A. Lawrence Lowell, on the part of the Institute, and Dr. H. P. Walcott and Mr. Charles F. Adams, 2d, on the part of Harvard), and presented to the Corporation, without comment, by the Executive Committee.

At the meeting of March 30, 1905, it was "*Voted*, That the ques-

tion [of the proposed agreement] be referred to the Faculty and Alumni, and their opinion be reported to the Corporation not later than June 1, 1905."

At an earlier meeting of the Corporation, held Dec. 14, 1904, it had been "*Voted*, That the President is authorized to request, on the part of the Corporation, the opinion of the Faculty as to the possible advantages or disadvantages of the proposed plan for a combination of effort with Harvard University from an educational standpoint, and is authorized, further, to refer the plan to the Alumni for an expression of their opinion in regard to it. All this information to be available to the Corporation before definite action is taken."

The Proposed Agreement has already been sent to all past students of the Institute. It will be reprinted, together with arguments for and against its adoption, in a SPECIAL ISSUE OF THE REVIEW to be published under authority of the Executive Committee of the Alumni Association, about May 15.

This special number will be devoted wholly to the question of the proposed Harvard-M. I. T. Alliance, and will contain, in addition to the matter above cited, a full report of a proposed meeting of the Alumni to be held, early in May, to discuss the Plan.

It will contain, also, the full text of a report to be made by the Faculty concerning the educational questions involved in the suggested alliance. The number will be sent, without charge, to all past students of the Institute whose addresses are available, and in connection with it there will be opportunity for every graduate to register his vote for or against the Proposed Agreement.

RESEARCH LABORATORY

The following advanced courses in Physical and Inorganic Chemistry are being given during the present term. Advanced students and members of the instructing staff are invited to attend the lecture courses, and, provided they wish to become regular working members of the class, to take part in the seminar meetings.

Advanced Inorganic Chemistry. Weekly seminar, conducted by Professors H. P. Talbot and F. J. Moore.

Advanced Theoretical Chemistry. Weekly seminar, conducted by Professor A. A. Noyes.

Radio-activity. Weekly seminar, conducted by Professor W. D. Coolidge.

Photo-chemistry. Eight lectures, by Professor H. M. Goodwin.

Constitution of Substances in Solution. Fifteen lectures in German, by Dr. W. Böttger.

Glass-blowing. Weekly laboratory exercises, conducted by Mr. C. A. Kraus.

Research Reports. Weekly colloquium, conducted by Professor A. A. Noyes and Mr. A. C. Melcher.

CHAIN TESTING MACHINE

A new addition to the equipment of the Applied Mechanics Laboratory is a chain cable testing machine of 150,000 pounds capacity. This machine, designed by Professor E. C. Fuller, is adapted to testing chain cables, hemp and wire ropes and knots, the long travel of the straining head, which is eight feet, allowing more stretch than is possible in the Emery or other tension machines. A specimen sixteen feet long can be held.

SUMMER COURSES

The following courses are offered for the present year:—

Mathematics: (*a*) Analytic Geometry; (*b*) Integral Calculus; Applied Mechanics. Mechanical Drawing and Descriptive Geometry. Mechanic Arts: (*a*) Woodwork; (*b*) Forging; (*c*) Chipping and Filing; (*d*) Machine-tool Work. Modern Languages: (*a*) French I.; (*b*) French II.; (*c*) Advanced French for Teachers; (*d*) German I.; (*e*) German II.; (*f*) Advanced German for Teachers. Chemistry: (*a*) Inorganic and Analytical Chemistry; (*b*) Organic Analysis and Preparations; (*c*) Air, Water, and

Food Analysis; (*d*) Industrial Chemistry; (*e*) Theoretical Chemistry; (*f*) Sugar Analysis. Physics: (*a*) Mechanics, Light, and Electricity; (*b*) Heat; (*c*) Physical Laboratory; (*d*) Electro-chemistry. Civil Engineering. Surveying: (*a*) Geodetic and Hydraulic. Mechanical Engineering: (*a*) Mechanism and Valve-gears; (*b*) Mechanical Engineering Drawing. Mining Engineering and Assaying. Architecture: (*a*) Shades and Shadows; (*b*) Elementary Design. Biology: (*a*) Sanitary Bacteriology; (*b*) Research in Bacteriology and Public Health; (*c*) Physiology; (*d*) Physical Hygiene.

SUMMER SCHOOL IN METALLURGY

It has been found impossible this year to repeat the Crocker Union Summer School of Mining, which was held so successfully last year in Colorado. Instead the regular M. I. T. Metallurgical Summer School will be held for a period of about three weeks during the month of June. The itinerary, as planned at present, covers lead smelting at Perth Amboy, copper smelting at Baltimore, and iron and steel metallurgy and coal mining at Pittsburg. This school is open to members of the second, third, and fourth year classes in Course III.

CONVOCATIONS

Dr. Charles Cuthbert Hall, president of Union Theological Seminary of New York and of the Religious Education Association, addressed the student body February 14 in the absence of Dr. Henry Van Dyke, who was unable to be present. Dr. Hall's theme was "The Growth of the Authoritative Claim of Religion."

The general convocation, March 21, was addressed by Dr. Lyman Abbot. His theme treated of politics in a very general way, and he showed that the difference of opinion concerning the problems before the governments to-day is chiefly due to a difference in the point of view from which one considers these questions.

INSTRUCTORS' CLUB

The Instructors' Club held its second monthly dinner on January 10, at the Union. Mr. Ross Turner spoke on "Primitive Art and Ornament," and its relation to the present. The lecture was illustrated by blackboard and stereopticon views.

The Club held its February dinner at the Technology Club. Instructor Sawyer gave a very interesting talk on the "History and Development of Modern Fire-arms," illustrating his talk with many guns from his own extensive collection.

The regular monthly dinner of the Club was held March 14 at the Tech Union. Mr. D. F. Comstock of the Physics Department gave an interesting talk on "Psychic Research and Phenomena."

INSTITUTE COLORS

BOSTON, March 17, 1905.

Mr. WALTER HUMPHREYS, Massachusetts Institute of Technology, Boston, Mass.

Dear Mr. Humphreys,—Replying to your letter of March 15, I have to state that it gives me much pleasure to forward all the information concerning the Institute colors that I possess.

At a meeting of the class of '79, held early in 1876, the question of a college color came up, and a committee, of which I was chairman, was appointed to consider the matter. All the single colors having been adopted by other colleges, the committee turned to combinations of shades. Each member submitted one or more, and these were passed upon by the whole committee. These combinations, I well remember, provoked much merriment. One member, who was a Kentuckian, was strongly in favor of bronze; and this was voted down after another member facetiously objected on the ground that it was the color of Kentucky's principal product. Other offerings, such as purple and green, blue and green, purple and yellow, and other inharmonious combinations, were eliminated; and finally the chairman's combination of cardinal red and silver gray was selected. The class voted to accept the committee's choice, and to ask the other classes to adopt cardinal and silver gray as the Institute colors; and, although this was a move on the part of the first-year men, the upper classes acquiesced. The colors were first used at the prize drill in May, 1876, when the battalion

guidons were made of red and gray silk, and later for hat bands, when the students visited the Centennial Exposition at Philadelphia.

The samples which you enclosed are the exact shades which were first chosen, the red being a bright shade, and sold as "cardinal red," a popular color at that time. Very truly yours,

(Signed) ALFRED T. WAITE.

FACULTY NOTES

Professor Tyler has been granted leave of absence for the remainder of the school year, and sailed for France on Saturday, March 4. He spent last summer in France, and his children have been attending a French school in Paris during the past winter. In the course of the spring it is his intention to become better acquainted with the French and German technological schools, and to devote considerable time also to various mathematical matters and incidental travelling. He expects to return to the Institute in August. During his absence Professor A. L. Merrill will act as Secretary of the Faculty. Professor Currier will have general charge of matters in connection with entrance examinations, Professor Spofford of questions on the recommendation of graduates for appointment, and Mr. A. T. Robinson of general correspondence.

At the annual dinner of the Yale Alumni Association of Boston and vicinity, February 21, Professor Sedgwick presided, and Professor Richards, representing the Institute, spoke of the work of the Summer School of Mining which was organized for Yale, Technology, Harvard, and Columbia by the efforts of Mr. John Hayes Hammond.

Professor Sedgwick, having been given leave of absence for the rest of the year, sailed March 18 for the Mediterranean. Mrs. Sedgwick accompanies him, and they expect to spend April in Sicily or Greece, May in Southern Italy, June in Northern Italy, and July and August in the Dolomites or the Tyrol, returning to Boston in time for the opening of the Institute in September.

Professor Prescott will have responsible charge of the Biological Department during Professor Sedgwick's absence, and Mr. Winslow

will have similar charge of the Sanitary Research Laboratory and Sewage Experiment Station, besides carrying on Professor Sedgwick's classes in General Biology and Sanitary Science.

A series of lectures on the propagation of electricity through vacuo and on radio activity are being given by Professor Cross. These lectures are optional, and are supplementary to second-year physics.

Dr. Pritchett was the orator at the Chicago Union League Club's annual celebration of Washington's Birthday. He took as his subject: "Is Politics a Profession or a Business?"

Professor Vogel has been appointed Head Reader of Examinations of the College Entrance Examination Board.

DEPARTMENT NOTES

CIVIL ENGINEERING

The Civil Engineering Society has held a number of meetings since the last issue of the REVIEW, and has made some excursions, the most interesting of which was through the East Boston Tunnel before the work was opened for traffic. This tunnel is interesting as having been constructed under the supervision of one of the Institute's graduates, Mr. Howard A. Carson, chief engineer of the Transit Commission; and a number of Institute alumni have been employed upon the work. The trip was most instructive to the members of the society. Following it, Mr. Carson addressed the society at one of its regular meetings, and explained the various technical points in connection with the tunnel. At another meeting of the society, Professor William T. Sedgwick of the Institute spoke of the Chicago drainage canal, explaining the technical questions involved in the controversy between that city and St. Louis regarding the diversion of the sewage of Chicago into the Illinois and Mississippi Rivers. The annual dinner of the society took place on the 30th of March.

A number of interesting theses are being carried on in the investigation of various matters relating to re-enforced concrete.

One of these is a continuation of a thesis of last year on the shearing strength of concrete; another is with reference to the bond of union between steel and concrete, also a continuation of a previous thesis; a third is with reference to the strength of T-beams; and a fourth is with reference to the tensile strength and elasticity of concrete.

MECHANICAL ENGINEERING

The number of candidates for graduation this year in Mechanical Engineering is fifty-nine, a much larger number than ever before. The titles of theses—two students often working together on one inquiry—are as follows:—

Air Filtration; Determination of Heat Necessary to prevent Freezing on Metallic Surfaces alternately exposed to Air and Water; Test of a Producer Gas Plant at North Easton; Line of Resistance in a Concrete Arch; Test of a 500 K. W. Curtis Turbine; Plant Test at Fairhaven, Mass.; Flow of Air against Back Pressure; Investigation of the Ventilation and Heating of the Fitchburg H. S. Building; Test of a Multistage Turbine Pump; C_p of Superheated Steam; Explosions in a Closed Vessel; Flow of Superheated Steam; Repeated Impact and Study of Fractures; Test of a Steam Ejector; Test of a Compressed Air Water Lift; Deflection of Locomotive Driver Springs; Slip and Creep of Belting; Stresses in Locomotive Connecting Rods; Tests on Ventilating Fans; Tests of a Pneumatic Tube System; Static Electricity; Re-enforced Concrete Beams; Investigation of Water Hammer; A Study of Dynamometer Car Diagrams; Tests of a Boyer Cooling Tower at Malden; Tests on a Steam Turbine; Re-enforced Concrete Columns; Moisture in Train Pipes; Torsional and Tensile Properties of Spring Steel; Comparative Tests of Tube Cleaners for Water Tube Boilers; Tests of a DeLaval Steam Turbine; Test of a Superheater; Tests of a Wainwright Condenser; Tests of a Kerosene Pumping Engine; A Study of a Cooling Tower; The Flow of Elastic Fluids through a DeLaval Nozzle; Efficiency Tests of an SO_2 Waste Heat Engine; A Study of an Electric Drive for Sewing-machines.

The number of students of all departments in the second, third, and fourth years (taking Mechanical Engineering Subjects) is seven hundred.

The Engineering Laboratories are crowded to their utmost; and much more apparatus is badly needed, which the Corporation has not seen its way to provide. A few additions have been slowly made by means of work which has been performed at such intervals as could be spared from the regular work. Of these may be mentioned the completion, after four years, of a chain testing machine of one hundred and fifty thousand pounds' capacity, and some apparatus for making experiments with superheated steam on a small scale. Moreover, the increased number of students taking Engineering Laboratory work has rendered it necessary to have the laboratories in operation, for their use, nearly every hour in the day.

The demand for condensing water has constantly increased; and, as city water had to be used for this purpose, the expense was large. Arrangements have finally been made, so that the cooling tower installed, three years ago, for the Electrical Laboratory could be employed to cool the water in the cisterns in the basements of the Engineering and of the Henry L. Pierce Buildings. This water in the cisterns is now pumped through the condensers into the tower, where it is cooled. From the tower the water flows back into the cisterns. A small turbine and pump and a plunger pump, motor-driven, have been installed to do the necessary pumping. It is estimated that the cost of the equipment will be saved in one year.

The Mechanical Engineering Society, organized and conducted by the students of the department, has had the privilege of having addresses this year from the following speakers, namely,—

Professor W. C. Unwin, "On the Work of the Standards Committee of England"; Mr. I. E. Moultrop, "On the L Street Turbine Plant"; Mr. C. H. Bigelow, "On Power-house Construction"; Mr. J. G. Callan, "On the Curtis Turbine."

MINING ENGINEERING

The numbers of students taking the mining course continue to be large. It is reported that sixty-six men in the first-year class have elected the mining course.

The large deficit in the Treasurer's account is, of necessity, cutting down expenses for apparatus in the Mining Department; but, even with this, some progress has been made toward improving the plant and investigating new lines. Investigations in classifiers have been progressing, and many new facts have been discovered in regard to the laws of classifying grains of sand according to their settling power in water.

The Department of Metallography is being organized with files of photographs of microscopic sections of metals for use of students in their study of the subject.

An interesting experiment is in progress on the separation of antimony from gold metallurgically in Nova Scotia ore.

The joint summer school, including Harvard, Yale, Columbia, and Technology, will not be continued this year. There are no funds with which to carry it on. The mining students will be invited to attend a summer school, visiting some of the metallurgical regions of Pennsylvania, including Pittsburg, and such other localities as can be included within the time available.

RESEARCH LABORATORY OF PHYSICAL CHEMISTRY

The Research Laboratory of Physical Chemistry of the Institute has received from the William E. Hale Research Fund a second grant of $1,000, which is being applied to an investigation upon the conductivity of fused salts carried out by Mr. R. D. Mailey, under the direction of Professor H. M. Goodwin. The Carnegie Institution has also renewed the grant of $2,000 to Professor A. A. Noyes for the purpose of promoting the researches in progress in the laboratory upon the conductivity of salts in aqueous solutions at high temperatures. These researches are being executed by Professor W. D. Coolidge, Mr. A. C. Melcher, and Mr. Y. Kato.

Additional investigations are being carried on by other research associates or research assistants, as follows: upon the rate of decomposition of minerals by water by Dr. W. Bottger; upon the physico-chemical properties of the solutions of metals in liquid ammonia by Mr. C. A. Kraus; and upon the dissociation-relations of phosphoric acid by Mr. G. A. Abbott. Other researches—upon the dissociation-relations of sulphuric acid, upon the hydrolysis of salts by water at 218° and above, upon the heat of solution of substances in relation to their dissociation, upon the diffusion of salts, and upon the qualitative detection of certain rare metals—are being pursued by graduate students who are candidates for the Ph.D. degree. There are seven such candidates at the present time, and to accommodate some of them an additional laboratory had to be equipped during the summer.

An important feature of the work of the laboratory is the advanced instruction given in connection with it. This consists for the most part of seminar meetings and lecture courses devoted to special topics of physical chemistry, which are varied from year to year. This year the courses embrace the subjects of chemical equilibrium, radio-activity, solid solutions, metals and alloys, photo-chemistry, and the constitution of substances in solution. The last-named course is given in German by Dr. W. Böttger. Instruction on the manipulative side, consisting in a course in glass-blowing, under the charge of Mr. C. A. Kraus, is also provided. Once a week, too, all workers in the laboratory meet to discuss the researches in progress there and the recent periodical literature.

ELECTRICAL ENGINEERING

On Thursday, December 12, Mr. Charles M. Green, of the General Electric Company of Lynn, gave a two-hour lecture to the Senior students on Arc Lighting. Mr. Green spoke of some of the recent developments in the arc lighting field, and gave a valuable general survey of the engineering proposition.

On Saturday afternoon, December 14, the General Electric Meter and Instrument Association visited the laboratories of the depart-

ment. There were about fifty men in the party, and they expressed much interest in the equipment and admiration for its methods of use.

Professor Clifford is giving lectures on Applied Electricity at Lawrence, Mass., under the White Fund.

Mr. Henry D. Jackson is giving the course on Electric Railroads this present term, and is getting out a valuable set of notes covering the ground of his lectures.

In connection with the power plant side of electric railroading, Mr. Howard L. Coburn, II., '98, gives certain lectures on the Mechanical Engineering of Electric Power Plants. Mr. Coburn has also written a very complete set of notes for the students, covering this particular side of engineering work.

Mr. A. N. Mansfield, VIII., '91, has just completed his lectures on Telephone Line Construction. This is the second year that Mr. Mansfield has undertaken this work.

One of the valuable courses which has been optional with the Senior Class this year is one given by Mr. A. T. Robinson, of the Department of English, on Dictation and Letter Forms. The character of the work is such as should appeal to engineering students especially, and it is hoped that later such work may become an integral part of the curriculum.

Mr. Charles H. Porter of the department has recently visited a number of the colleges having electrical engineering courses, with the idea of comparing them with our own. He has obtained considerable information of value to the department.

On Saturday evening, February 18, Professor Clifford lectured before the General Electric Night School at Schenectady on the subject of Mechanics. This school is made up of employees of the General Electric Company, who are anxious to gain a knowledge of the fundamental principles of science, although certain lectures, of which this was one, are open to the public.

On Monday, February 20, Mr. Charles E. Downton, who is foreman of apprentices of the Westinghouse Company at Pittsburg, gave an illustrated lecture on the work of the Westinghouse Company, with special reference to the apprenticeship course. This

lecture was intended more particularly for the students in Electrical Engineering, although the students of other courses were invited, and Room 6, Lowell Building, was crowded. The lecture was illustrated by moving pictures showing the trip from Pittsburg out to the works, the construction and handling of apparatus in the works, and various features of interest to one considering entering the employ of the Westinghouse Company as an apprentice. This is Mr. Downton's second visit in connection with securing men for his company, and provided a delightful occasion for the instructing staff as well as the students.

On Monday, March 13, Mr. T. G. Richards, II., '94, gave a very valuable talk on Shop Economy. This important subject is far too little considered by the average student, and the department is certainly to be congratulated on having so forceful a presentation of the matter as that given by Mr. Richards.

On Saturday afternoon, February 25, Professor Clifford gave a lecture on Alternating Currents and their Place in the High School Course before the Eastern Association of Physics Teachers. The lecture was illustrated by various pieces of apparatus, most of which has been constructed in the department, and subsequent to the lecture the laboratories were inspected.

On the afternoon of Tuesday, February 28, thirty-one men of the Seniors in the department and four of the instructing staff started on a trip of inspection of various electrical industries. The trip from Boston to Albany was made in a special Pullman, provided by President Tuttle of the Boston & Maine, who also gave free transportation to the entire party. This generosity on his part is deeply appreciated by the department, since it enabled some students to obtain the advantages of the trip who otherwise would have found it impossible to do so.

All day Wednesday and Thursday morning were spent at the General Electric Works at Schenectady and in the Dock Street Power Station of the Schenectady Street Railway Company. The party was met on Wednesday morning by E. E. Kimball, '02, W. E. Mitchell, '03, and Lyon, II., '04, who acted as guides in showing the men through the works. Mr. Mitchell also spent Wednes-

day morning with the party. Thursday afternoon the train was taken to New York, where Friday was spent in visiting the Waterside plant of the Edison Company and the Interborough Subway Power Station at 59th Street and North River. At both of these places, guides were provided by the New York Edison Company and the Interborough Traction Company, and, indeed, throughout the visit every courtesy was shown by the companies concerned.

On Saturday morning a visit was made to the Harrison Lamp Works of the General Electric Company. The party were met at the railroad station by the assistant engineer and superintendent of the works, and every attention was shown them during the visit. This proved a very interesting finale to the trip, most of the men returning home on Saturday afternoon.

The benefit of such a trip as this cannot be overestimated. It gives just at the beginning of the term an inspiration and an incentive to work, which is very valuable. The thesis work is well under way, the subjects chosen by the various men being shown in the following list:—

Test of Electric Plant of Atlas Tack Company; Tests of Power Plant of the Augustus Lowell Laboratory; Power Transmission over an Artificial Transmission Line; Car Runs, Syracuse Railroad; Test of Electric Plant of United Shoe Machinery Company; Sparking Distance as related to Frequency; Study of Enclosed Fuses; Test of the Electric Plant of the Nashua Light and Power Company; A Method for determining Hysteresis; Tests on the Crane in the Augustus Lowell Laboratory; A Study of the Quarter Phase Unit in the Augustus Lowell Laboratory; Car Tests on the Boston & Worcester; Puncture Tests; Test of Transformer in Walker Building; Study of Series A. C. Motor; Study of Three Wire Generators; Study of Electrolysis in Street Railway Systems.

ENGLISH

The division of the large class in second-year English Literature into small sections, which has been made this year, is bringing about excellent results. It is always a question how large a class

in any lecture course may be made with advantage; and the English Department, at least, is convinced that for its work it is better to deal with sections than with entire classes. The work is this year divided between Professor Bates and Professor Pearson.

Interest in Advanced English Composition is sufficient to make a small class continue as volunteer work this term the course which was last term given to third-year men. Several students applied for this course who were prevented from entering it by the impossibility of adjusting their tabular views.

MODERN LANGUAGES

The new head of the department, Professor John Bigelow, Jr., entered upon his duties on the 1st of February. He opened the course for the second term on the 7th of February by an address to the first-year students on the study of modern languages. Associate Professor Vogel has been appointed professor. He has charge, under Professor Bigelow, of the classes in German. Professor Bigelow takes immediate charge of the classes in French, and Mr. Erhardt of the class in Spanish. There is no class in Italian this term.

The department is considering the practicability and advisability of introducing the graphophone, or talking machine, as an aid to the students in acquiring the pronunciation of the languages taught. A couple of Victor talking machines are rented for the term for experimental use.

THE UNDERGRADUATES

THE TECH SHOW

Rehearsals are now well under way for the Tech Show, and the prospect seems bright for a production that will at least rival the successes of former years. Most of the principals of last year's Show will be seen again this year, and several men from last year's chorus have been promoted to leading parts. The Book of the Show follows closely the lines of conventional comic opera. This was one of the most noticeable features of last year's Show, and it is believed that the effect is much better than when the main features were local allusions, which were quite unintelligible to most in the audiences. The Show was written by George H. Bryant, '07, of Haverhill. The music, which is said to be unusually good, is by Emerson H. Packard, '07, of Brockton, and Ralph B. Sanders, '07, of Lowell.

The managers of the Show are again facing the problem of some satisfactory method of seat distribution. The method of past years, allotting seats in the order of filing applications, resulted in the line being formed fourteen hours before the filing could take place; and this caused much unnecessary hardship and many complaints. It is practically certain that this method will be superseded by some other, but just what change will be made is still under discussion. The probability is that the distribution will be by lot, or that the seats will be disposed of by auction. Opinion among the undergraduates seems to favor the first method. The managing staff consists of: P. E. Hinkley, '05, of Portland, Me., general manager; R. G. Kann, '07, of Pittsburg, stage manager; Alexander Macomber, '07, of Newton, assistant stage manager; R. W. Parlin, '07, of Wollaston, business manager; F. S. Hamilton, '07, of South Blue Hill, Me., assistant business manager; E. F. Whitney, '07, of Natchez, Miss., press representative.

The popularity of the Show is well evidenced by the fact that eighty-six men are rehearsing for the chorus. The principals, as in

"Simon Pure Brass," number twelve. Miss Kate Ryan is coach this year. John Coleman, as usual, is in charge of the dancing, and Mullaly is training the chorus.

CLUBS AND SOCIETIES

Civic Club.—Mr. Curtis Guild, lieutenant governor of Massachusetts, addressed the Club January 11 at the Tech Union on "The Duties of a Citizen."

Mr. J. A. Lowell, State Representative from Newton, addressed the Club on "Trade Schools" March 14.

Civil Engineering Society.—Mr. F. E. Matthes, '95, and Dean Burton spoke to the Society, March 16, on the subject of "The Civil Engineering Summer School." Mr. Matthes, who is a topographer on the United States Geological Survey, spoke of the enormous practical value of the work performed in the summer school. Dean Burton followed with an historical and descriptive account of the various summer schools. The first school was held in 1888, and since that time has been held every year until last summer. He described the work done, and showed pictures of the various features of the schools.

This year's school will probably be held at East Machias, Me. The work taken up in the school consists of triangulation, plane-table work, and practice in certain hydrographic branches.

Architectural Society.—Mr. R. A. Cram addressed the Society, March 15, on "The New West Point Buildings." Congress appropriated $5,500,000 for about sixty buildings. Ten architectural firms were invited to take part in the competition, which was won by the Boston firm of Cram, Goodhue & Ferguson.

Co-operative Society.—The board of directors at its meeting March 25 appropriated $1,000 for scholarship purposes. Thirteen $75 scholarships and one $25 scholarship were awarded.

Republican Club.—Of the profit shown by the treasurer's report ($36.06), $10 has been turned over to the hockey team. The balance has been used to purchase for Tech Union a picture of John D. Runkle.

Maine Club.—At a meeting March 13 the following officers were elected: president, W. F. Smart; vice-president, J. P. Chadwick; secretary and treasurer, F. W. Libbey. Plans were made for smokers at the Union, and also for an annual dinner to be held during Junior Week.

Texas Club.—At a dinner held March 16 the following officers were elected: president, G. C. Simpson, '06; vice-president, G. A. Quinlan, '05; secretary, J. G. Harrison, Jr., '06.

British Empire Association.—A meeting of all British subjects at Tech was held March 22. A committee of seven was appointed to draw up a set of rules and by-laws.

Walker Club.—The second dinner of the Walker Club for this term was held at the Technology Club, March 17. Colonel Thomas L. Livermore, of the Corporation, outlined the military career of General Francis A. Walker, with whom he was associated during the Civil War. Dr. Pritchett and Dean Burton also spoke during the evening.

Playgoers Club.—A meeting of those interested in play-going was held March 3 in 11 Rogers. There was an informal discussion of present-day plays and a short talk by Mr. H. L. Seaver upon the English playwright, Henry Arthur Jones. It was agreed by those present that, while no organization was at present advisable, a bulletin of current theatrical events should be kept.

KOMMERS

The feature of the Kommers, February 18, was an interesting debate between representatives of the Walker and Civic Clubs. The subject of debate was, "*Resolved*, That the influence of national political parties is detrimental to the best city government." The Walker Club was represented by Curtis, Loring, and Greeley, who spoke in the affirmative, while Bell, Hutchings, and Witmer supported the negative. The judges, Dr. Noyes, Mr. Seaver, and Mr. Doten, rendered a decision for the affirmative.

Fifty-two men attended the Western Kommers March 25, a majority of the number being Western men. Professor Erastus E.

Smith, of Beloit College, Wis., who is at the Institute studying Eastern sanitary methods, was the guest of honor. He told the men of a Kommers at a German university.

TECH HOUSE

One of the most unostentatious branches of student activity at the Institute, and one which is at the same time one of the most praiseworthy in its character, is the organization known as Tech House. This is situated in one of the poorer parts of the city in the heart of a tenement district, and here about a dozen students of the Institute live for the purpose of becoming better acquainted with this phase of life and at the same time of benefiting some one else.

Y. M. C. A.

At a meeting held March 2 of representatives from the Faculty, the Boston Y. M. C. A., and the Tech Y. M. C. A., it was voted to employ a general college secretary for Technology next year.

Mr. J. E. Smiley leads two Bible classes on Sunday afternoons. The Freshman course meets at 2.30, and the advanced course at 4.30, in the Boston Y. M. C. A.

THE SENIOR CLASS

The last Senior dinner was held at Tech Union, March 2. One hundred and thirty-three men were present. G. W. C. Whiting acted as toastmaster for the evening, and was introduced by President Motter. Mr. Munroe, Mr. Homer S. Albers, Professor Sedgwick, T. E. Jewett, Mr. Bourne, B. E. Lindsly, and E. B. Hill spoke. At this dinner the Senior Class voted to raise money to restore part of the frieze that formerly adorned Huntington Hall, and to present it on Class Day. About $270 was subscribed in a very few minutes, so the restoration of the frieze is assured. A committee of the class has been appointed to secure more subscriptions,

and it is expected that three panels will be restored,—the one directly over the platform, from which the present Tech seal is derived, and one larger panel on either side.

At eight o'clock, January 2, the annual 128-hour engine and boiler test was begun. The members of Courses II., VI., X., and XIII. in the Senior Class joined in the work, the Course VI. men taking care of the electrical part of the work. During the test the boilers were run constantly day and night, the engines from 8 A.M. to 4 P.M. daily. The men worked twenty at a time in eight-hour shifts during the day, and four men were kept at work on the boilers all night.

COURSE IV. COMPETITION

Last year the graduating class in Course IV. founded two prizes of $10 each to be given yearly to the regular and special students whose designs shall be placed first in a competition to be held between the Christmas and mid-year recesses, the fund to be known as the "Class of 1904 Competition Prize." The first award has just been made to Mr. A. A. Blodgett of the regulars and Mr. P. F. Mann of the specials.

ATHLETICS

THE GYMNASIUM

The Boston & Albany Railroad, which owns the land on which the Tech gymnasium stands, has served notice that it must be vacated on the 15th of May. As it will take some time to dismantle the Gym, its use by the men will probably be allowed until the first of June. A new gymnasium of a temporary character will be erected during the summer.

THE INDOOR MEET

In the annual indoor meet, held February 16, '07 was again victorious. Individual honors were divided between R. D. Farrington,

'05, who won the high jump easily, at 5 feet 5½ inches, and obtained second place in the high hurdles, and E. P. Noyes, '07, who was first in the 45-yard high hurdles and second in the 40-yard dash.

Summary of Points

	1905	1906	1907	1908
40-yard Dash	1	–	8	2
45-yard Hurdles	3	–	8	
Potato Race	5	5	1	–
Shot Put	6	2	–	3
High Jump	5	4	2	–
Relay Race	–	–	11	–
Totals	20	11	30	5

FENCING

Technology defeated Columbia and Harvard in the Triangular Fencing Meet at the Gym, February 21, winning eleven bouts. Columbia and Harvard tied for second place, each winning eight bouts.

Technology defeated Cornell and Harvard in the Fencing Meet at the Gym, March 3, winning thirteen out of a possible eighteen bouts. Cornell finished second, with eleven bouts to her credit, and Harvard last, with three bouts.

The Tech Fencing Team won the Amateur Junior Team Fencing Championship at a tournament held at the Fencers' Club at New York, Saturday evening, March 11. Five teams, representing Columbia University, New York Athletic Club, Brooklyn Fencers' Club, New York Turnverein, and the Massachusetts Institute of Technology, competed.

GYMNASTIC MEET

The Tech Gymnastic Team gave an exhibition at the Gym March 24. The first team performed on the high horizontal, the long and side horse, the rings and the parallel bars, and gave a good exhibition of tumbling and pyramid forming.

THE GRADUATES

CLASS BANNERS

The following banners were lost at the Alumni Reunion last June: '68 to '75, inclusive, '97, and '99 to '04, inclusive. These banners are needed again. Readers of the REVIEW who may know the whereabouts of any of them are earnestly requested to communicate immediately with Prof. Charles M. Spofford, Massachusetts Institute of Technology.

EARLY DAYS OF FOOTBALL AT THE TECH

Now that the M. I. T. has an athletic field of its own, it seems more than probable that we shall soon see a return to competitive athletics, not necessarily to that all-absorbing and too frequent attention to the football fetich which dominates many other institutions, but to a sensible and healthy practice of sport, with just enough outside competition to broaden the character of young men who possibly suffer from a self-centring concentration. It is customary to aver that the Tech could never amount to anything in athletics, yet we used to beat Amherst and Dartmouth at football, and they have since defeated Harvard.

The author's knowledge of Tech football dates from the fall of 1883. A team from the Institute went over to Cambridge at that time, and was beaten about 18 to 2, according to the modern system of scoring. Frank Haines and "Fatty" Baldwin are remembered as being the particular stars of that aggregation. The '87 Freshmen beat Adams Academy with their own team, and played a tie with Tufts, with the aid of a few upper classmen. The next year brought a definite attempt at a regular schedule. The Union Athletic Grounds, now occupied by the Armory, on Dartmouth Street, were hired. Six games were played without one victory, yet we scored on Harvard, and got a date from Yale. The class of '85

furnished Mahon and Steele; '86, Winsor, Fletcher, and Bartlett; '87, Douglas, Cooley, Twombly, Shortall, and Sturges; and '88, a strong trio in Herrick, Ladd, and Vorce. The lack of a Second Eleven prevented proper preparation, and the men were not used to each other. Most of them turned up next year, however, and took up the game where they left off the year before.

As Harvard was not allowed to play at this time, their half-back, Holden, took a course at Tech, and Peters of the Medical School was also allowed to play from reasons of individual friendship. In looking back, it is possible that we should have done as well to use other men, and thus keep the spirit more harmonious. Cooley was elected captain; and the squad was re-enforced by Taintor and Bowles of '87, Devens of '88, and Durfee and Wadsworth of '89. We had entered a league with Williams, Amherst, and Tufts. The eleven played nine games, losing only to Williams and Yale. It ran up tremendous scores against Tufts and Amherst, 110 to 0, and some 70 to 0. Williams was easily beaten in our second game, making a tie with them for the championship, which was played off at Springfield. Those who saw that game will never forget it. The ground was covered with about six inches of wet snow, the lines being marked with a hoe. A driving sleet chilled players and spectators as well. In fact, it was necessary to thaw men out at a stove near by at frequent intervals. Players were tackled in puddles of snow-water that covered them from view. The ball was slippery, and skilled play impossible. Williams came down from the Berkshires, where it rains five days in the week at this time of the year, and won handily.

This season brought forth some semblance of a second eleven. It was very crude in make-up, students volunteering without suits, simply removing coats for the fray. The regular team stood up against all comers, no matter what their quantity. It was quite customary to have ten or twelve men in the opposing rush-line. The game at that period included more passing and open-play. Interference was primitive, the runner usually looking out for himself. The backs rarely bucked the centre, and punted frequently. The quarter-back gave silent signals, and his own

rush-line rarely knew what play was in progress. Yale came up from New Haven to play us, and we profited from advice from such experts as Peters and Beecher. Sturges and Shortall went back to Chicago at the close of the year, Sturges playing later on the strong Chicago Athletic Club team. We also lost Fletcher and Cooley.

The fall of '86 brought out such men as Bemis, Fish, Kimball, Duane, Dearborn, Tracy, Dame, Goodhue, and a lot of substitutes. Our back-field was superb. Herrick, the captain, was trained at Exeter, and could have won a place on any college team. He was so versatile that he took the place of our centre-rush in a game when Taintor was unjustly disqualified, and pushed his beefy opponent all over the field. Quite a change of position for a light quarter-back! Duane was a great find. Many believe him the best back that ever played on a Tech team. He had a peculiar way of evading an intending tackler, often getting away from a half-dozen, one after the other. In one Harvard game we kept the ball for fifteen minutes by letting him run with it again and again. He could stand any amount of hard usage, caught well, tackled well, and punted fairly. Bemis was an old Harvard player who played infrequently, but did good work, when willing. Durfee and Dearborn played in the back-field at times under the names of Watts and Hadley, their parents objecting to the dangers of the game. Devens, our full-back, impressed Yale so well that they wanted him to come to New Haven. Taintor developed into a most reliable centre, and Fish did some spectacular work at times. Twelve games were played in all, with considerable hard luck. We tied Williams, beat Tufts and Exeter, were robbed in a close game with Dartmouth, and broke even with Amherst. Andover beat us by two points, and Yale and Harvard simply overwhelmed us. The first Sophomore-Freshman game occurred in this fall of 1886. The class of '89 had many regular players, the class of '90 but 1; yet victory was with the Freshmen. This hardly equalled the record of the '91 men, however, who played six games with outside teams, and won them all.

It was in the year of '87 that football at the Tech was in its zenith. Herrick was still captain, and a light young Dutchman named Germer made a good mate for Duane. Vorce, Ladd, Devens, Goodhue, and Tracy were in their accustomed places; and the new men, Roberts, Hamilton, and Mitchell, rounded out a strong aggregation. This team held Harvard to a score of 12 to 10, played seven games in which its opponents failed to score at all, defeated every team in its own league, winning the championship with Dartmouth, its nearest competitor, and was universally admitted to be the strongest eleven in New England outside of Yale and Harvard.

It would seem as if this were a good place for the historian to stop. If later elevens did equal deeds, they failed to be as well remembered. There may be honors awaiting future players that will make these records dwindle by comparison, but they will certainly be long in coming.

It was all so different in these early days. The teams which now cost their colleges from ten to twenty thousand dollars per year would smile at the few hundred dollars spent in our totals that also included rent of home grounds. Our players wore few, if any, pads, or guards. They were light in weight, averaging about one hundred and sixty pounds per man. We had no paid coaches and no regular coaches. The present line-plunging style of play was not then in vogue. Team work was in its infancy, but the individual resourcefulness of the individual was more in evidence. The game, as a whole, was certainly more interesting to the spectator, and possibly to the player as well.

The writer assumes no special authority in making these statements. The active player might be a better critic, but not so impartial a judge. Those of us who served as chopping-blocks on the second eleven know best who tackled the hardest. We saw more from the side-lines at the big games than those who were on the field itself. From the standpoint of varied business experiences one looks back with considerable envy to the days of mimic warfare on the football field. The competition of real life is hardly preferable for either interest or excitement. And so

some of us hope that the new athletic grounds will give new chances for those physical contests which bring out the characteristics of self-reliance, mutual allegiance, grasp of opportunity, and adaptability to conditions.

GEORGE OTIS DRAPER, '87.

ASSOCIATION OF CLASS SECRETARIES OF THE M. I. T.

A special meeting of the Association of Class Secretaries was held at the Technology Club on Thursday evening, March 16, 1905, Professor R. H. Richards, '68, being chosen chairman of the meeting.

The Committee on Closer Relations among Graduate Organizations reported, through C. F. Read, '74, chairman, the progress of its work in securing data as to the organization of the local Technology societies.

A letter from the class of '93 was read, calling attention to the fact that the establishment of the custom of holding class dinners at the time of graduation was one of the objects for which the Tech Reunion of last year was held, and urging the Association to take whatever action might be necessary to encourage the classes generally to meet at commencement this year. Discussion showed that already a number of classes are planning to hold dinners at this time, and it was thought to be especially desirable to have on that evening a well-managed "Tech Night Pop Concert," with good representation of alumni as well as of the graduating class and undergraduates.

Upon motion of I. W. Litchfield, '85, it was voted to appoint a committee to take charge of all feasible arrangements for the observance of graduation day by the alumni, and to invite the undergraduates to appoint a committee to co-operate with the alumni committee. The committee appointed by the Association consists of Herbert N. Dawes, '93 (chairman), Charles C. Pierce, '86, Howard L. Coburn, '87, Charles F. Park, '92, William W. Crosby, '93, Leo W. Pickert, '93, J. Arnold Rockwell, '96, Walter Humphreys, '97, Charles-Edward A. Winslow, '98, Richard Wastcoat,

'00, Bernard Blum, '04, William D. B. Motter, Jr., '05, Robert H. W. Lord, '05, Stewart E. Coey, '06, Frank S. McGregor, '07, William B. Given, Jr., '08.

The subject of Technology representation in the various university clubs was brought up by J. P. Munroe, '82, who read a letter from H. A. Boyd, '79, secretary of the Tech Society of Western New York, asking where a large photograph of President Rogers could be obtained for the University Club of Buffalo, and making inquiry as to whether the REVIEW was sent regularly to that club. Upon motion of H. L. Coburn, '98, it was voted to appoint a committee of three to secure proper Technology representation in the university clubs throughout the country.

Mr. Munroe referred to a letter from the Dean of the Institute, calling attention to the fact that the banners used at the Tech Reunion, so far as they could be found, had been hung on the walls of the Tech Union, but that the banners of several of the classes had disappeared after the banquet at Hotel Somerset. A committee, consisting of I. W. Litchfield, '85, and C. M. Spofford, '93 (chairman and secretary of the Tech Reunion Excursion Committee), was appointed to see that the missing banners are returned or replaced by new banners. The remainder of the evening was given to consideration of the report of the Committee on Publication of the TECHNOLOGY REVIEW.

FREDERIC H. FAY, '93, *Secretary.*

THE TECHNOLOGY CLUB OF NEW YORK

On Wednesday evening, January 10, Mr. Oscar T. Crosby gave a very instructive and interesting talk, illustrated by lantern-slides, on "Turkestan and a Corner of Tibet." Mr. Crosby recently made an extensive trip through this part of Asia, and is an authority on the subject. He took up more especially the political phases of the present situation in Asia, dealing at considerable length on the Colonel Younghusband expedition into Tibet, its cause and probable effect on the future relation of England and Russia in Asia. While his talk was primarily devoted to the

political situation, he told something of the difficulties attending such a trip, both geographical and political, and related in a most interesting manner some of his very narrow escapes from death.

The annual meeting of the club was held on Saturday evening, February 4, at the club. The regular reports of the officers were read and accepted. Nominations were then made by the usual ballot, and Cecil B. Annett elected a member of the board of governors to fill the vacancy caused by the resignation of Clyde R. Place, whose term expired. The meeting was then adjourned.

The tenth annual dinner of the club was held the same evening in the marble banquet hall of the Hotel St. Regis. The dinner was in every way a great success, and great praise is due the dinner committee for the very efficient and satisfactory manner in which they managed the whole affair. The dinner consisted of thirteen courses, and was served in a manner befitting one of the most famous hotels in the world. President Pritchett, Mr. Kerr, of the Westinghouse Church Kerr Company, Colonel Eugene Griffin, vice-president of the General Electric Company, and Frank A. Vanderlip, vice-president National City Bank, were the guests of the evening. President McKim, acting as toastmaster, introduced President Pritchett, who told us something of the work that has been undertaken at the Institute during the past year, the changes, and the plans for the future. He assured us that the Institute is not passing through a crisis, and that, whatever happens, the Institute is sure to grow and expand, that we can place entire confidence in the Corporation, and rest assured that they will do everything in their power to further the interests of Technology.

Mr. Kerr was then introduced, and gave a very interesting and entertaining talk. He dwelt at some length on the necessity of performing a certain amount of work in a given time, and of the failure of many instructors to fully appreciate this principle, giving illustrations showing marked inconsistency between the time assigned to do certain work in the colleges and the time allowed in commercial establishments. He outlined a rather novel plan that he has adopted as a member of the Corporation of Cornell

University by which professors are given a leave of absence in order that they may spend some time in some large commercial or engineering establishment, and thus come into contact with the very real conditions of modern business enterprises.

The Dinner, Debate, and Card Tournament, arranged by the Entertainment Committee, on February 28 was well attended; and all reported a very pleasant evening.

The growth of the club during the past year has been most satisfactory, and it is hoped that all Institute men coming to New York and vicinity will place themselves in position to enjoy its many advantages.

C. B. ANNETT, '02, *Secretary*,
36 East 28th Street, New York, N.Y.

ROCKY MOUNTAIN TECHNOLOGY CLUB

The Western members of the Technology alumni have recently reorganized into an association known as the Rocky Mountain Technology Club: president, Frank E. Shepard, '87; vice-president, Theodore E. Schwarz, '76; secretary, Harold O. Bosworth, '02; treasurer, Joseph Y. Parce, Jr., '93. A meeting of this association was held at the University Club in November, 1904.

Several Tech graduates are here in connection with the work of the Geological Survey, and we hope to have another meeting on March 18 at the University Club, Denver, in order that the Geological Survey men may have an opportunity of meeting some of our Western members.

W. C. Brace, '87, has recently made a trip to Mexico on personal work in connection with mine examinations.

C. S. Robinson, general manager, Steel Works, Pueblo, Col., is in charge of very extensive works in connection with the steel plant which promises to make this one of the leading plants of the world. This steel plant is assuming very large proportions, and many Tech men have been associated in the development of the various details.

The writer has been recently associated in the design of a large

mill for the treatment of ores at the Dives-Pelican properties in Silver Plume, Col., also large concentrating mills for the Gold King Mine of Silverton and the Gold Prince Mill, Animas Forks, Col.

FRANK E. SHEPARD, '87, *President*,
30th and Blake Streets, Denver, Col.

TECHNOLOGY CLUB OF THE MERRIMACK VALLEY

The annual meeting of the club was held on Friday evening, Feb. 3, 1905, at the Essex House, Lawrence, sixteen members being present. Previous to the meeting, dinner was served in the café.

In the absence of the president and vice-president the meeting was called to order by the secretary. Mr. R. A. Hale was elected temporary chairman. Mr. Everett Morss, chairman of the Technology Fund Committee, was the guest of the evening, and, as he was obliged to leave on an early train, the election of officers and other official business was postponed until later in the evening.

Mr. Morss spoke at some length upon the merger question, reviewing it in all of its phases and presenting all points from which it might be considered. He emphasized the length of time that must necessarily ensue before the Institute could derive benefit from the McKay Fund, and then only to a limited extent. He cited the latest developments, especially relative to the interest held by the Institute in a tract of land in Hyde Park that had recently changed hands.

At the close of Mr. Morss's address the regular business of the evening was taken up. The report of the treasurer was read and approved. Mr. Silsbee, Mr. Sjöström, and Mr. Fairfield were appointed by the chair as a committee to bring in a list of names to be voted on for president, vice-president, and member of executive committee. The committee retired and, on returning, presented the following names:—

For president, Mr. R. A. Hale, Lawrence.

For vice-president, Mr. George A. Nelson, Lowell.

For member executive committee, Mr. Edgar A. Barker, Lowell.

It was voted that the secretary cast one ballot for the above nominees, which he did; and the same were declared elected.

Voted, That the treasurer be authorized to send out due bills to all known men in the Merrimack Valley and membership cards to all who pay their dues.

Voted, To hold the next meeting in Lowell some time in March.

JOHN A. COLLINS, JR., *Secretary*,
74 Saunders Street, Lawrence, Mass.

THE TECHNOLOGY CLUB OF RHODE ISLAND

(The REVIEW greatly regrets that, through editorial oversight, no account of the organization of this important club was given in the January number, and Mr. Ballou's name was omitted from the list of The Association of Class Secretaries.)

The organization of the Technology Club of Rhode Island was effected at a dinner held at the Crown Hotel, Providence, on the evening of Dec. 3, 1904. More than fifty men were present, and, after adopting a constitution, the following officers were elected to serve during the ensuing year: president, Frederick H. Howland, '93, Providence; vice-president, Kenneth F. Wood, '94, Pawtucket; secretary and treasurer, Latimer W. Ballou, '95, Woonsocket; executive committee (including the above), Earl P. Mason, '97, Newport, and James G. Woolworth, '79, Providence.

Following the business meeting, the newly formed club was addressed by the following guests, all of them speaking upon the subject of the proposed Harvard-Technology alliance,—Dr. Francis H. Williams, Mr. Samuel Cabot, and Mr. James P. Munroe, of the Corporation of the Institute, Professor Davis R. Dewey, of the Faculty, and Mr. Edward G. Thomas, of the Income Fund Committee. Mr. Thomas spoke upon the Income Fund, as well as upon the question of alliance.

On February 23 the secretary of the club sent a copy of the constitution to all Rhode Island men eligible to membership, who had not enrolled themselves as members at the December meeting, urging them to join; and it is confidently expected that, by the time of the first annual meeting in May, the membership will be at least one hundred. The executive committee are planning to hold, before that date, one or more informal gatherings.

LATIMER W. BALLOU, '95, *Secretary*,
17 Harris Avenue, Woonsocket, R.I.

THE TECHNOLOGY CLUB OF PHILADELPHIA

About fifty men were present at the annual dinner of the Technology Club of Philadelphia, Monday, March 6. Among the speakers were President Pritchett, who spoke on "Technology and its Problems."

S. A. GARDNER, Jr., '02, *Secretary*,
Woodbury, N.J.

M. I. T. CLUB OF CINCINNATI

The annual meeting and banquet of the Cincinnati M. I. T. Club was held at the Business Men's Club on Monday, February 27, twenty members being present. A very interesting address was delivered by Dr. Thomas Evans on the importance of systematic experimentation in connection with the industrial operators.

Mr. Arthur S. More, who had been at a banquet of the Northwestern M. I. T. two days before, in Chicago, gave us a résumé of President Pritchett's remarks on union.

At the business meeting the following officers were elected: Charles G. Merrell, president; S. A. Hooker, vice-president; George W. Kittredge, treasurer; A. H. Pugh, Jr., secretary.

A. H. PUGH, '97, *Secretary*,
1912 Madison Road, Cincinnati, Ohio.

THE TECHNOLOGY CLUB

The season has continued at the club with several talks. Since the first evening, which was mentioned in the last number of the REVIEW, Professor Archibald C. Coolidge, Ph.D., of Harvard University, gave a smoke-talk on "Russia in the Present War." This was followed on the third evening, January 10, by a talk on "Japan in the Present War," by Joseph B. Millet, Esq. Both of these talks were very well attended, and much interest was shown. On the fourth evening, February 1, Mr. Howard DuBois gave a beautifully illustrated lecture on "British Columbia." Ladies were invited to this lecture. The fifth evening, March 13, a smoke-talk was given by Dr. Richard Hodgson, secretary of the Society for Psychical Research, on "Psychical Research." Preceding the smoke-talk of December 15 the club by-laws were changed, so that the present section of Article 12 reads as follows:—

SECTION 1. Any person joining the club shall pay an admission fee of ten dollars, except that for non-resident members the admission fee shall be five dollars; but no admission fee shall be required of an undergraduate. No person shall be considered a member or be entitled to any privileges in the club until the admission requirements are fulfilled.

As a result of the above, an unusual number of undergraduates have availed themselves of membership in the club.

The committee appointed to care for the portrait of the first president, Mr. James P. Munroe, reports that Mr. Joseph De Camp has been chosen for the artist, and the portrait is already well advanced.

WALTER HUMPHREYS, '97, *Secretary*,
83 Newbury Street, Boston.

NEWS FROM THE CLASSES

1868.

PROF. ROBERT H. RICHARDS, *Sec.*, Mass. Inst. of Tech., Boston.

Mr. Walter H. Sears writes:—

During the year we finished up most of the bridges and abutments on the upper twelve miles of the reservoir, and got the Muscoot Dam so far completed as to be able to flood a considerable area. I also made investigations as to possible locations of possible reservoirs on the Croton Watershed, with the result that two new reservoirs are to be built with a combined capacity of about thirty billion gallons.

He finished up the work for the Northern New Jersey Flood Commission early in the year. He is now division engineer for the city of New York aqueduct commissioners, and is located at Katonah, N.Y.—Joseph Stone, in discussing the present condition of Technology, asks the question, "Why should not the number of the students in the Institute be limited, say, to fifteen hundred, and in that way avoid the evils from crowded buildings and excessive financial deficits?" He also asks the question, "Why should not the students of a technical institution pay the price of what they receive?"—James P. Tolman has gone abroad for a little vacation, to make a trip to Italy.—Whitney Conant is contemplating a trip to Ohio, to advise in regard to water supply.—William E. Hoyt, and in fact many of the members of the class of '68, have expressed the hope that the question of the alliance will speedily be settled, as the state of suspense until that time cannot be otherwise than trying to all.

1875.

E. A. W. HAMMATT, *Sec.*, 10 Neponset Block, Hyde Park, Mass.

The annual meeting and dinner of the class of '75 occurred on the evening of March 10, 1905, at Young's Hotel, Vice-President

B. L. Beal presiding. A letter from President Hibbard was read, stating that on account of sickness he could not attend, and urging upon the boys that he was not a candidate for re-election, adding, "This is no joke!" It was taken as a decided one, however, as it was insisted that Hibbard, as well as the other officers, should serve another year. There were present Beal, Bowers, Dabney, Dorr, Hammatt, Mixter, Warren, and Willard.—Robey writes that he is with the Wellman-Seaver-Morgan Engineering Company, in charge of their steel foundry. He would like to see any of the boys who may visit Cleveland.—R. H. Cushing, whose whereabouts I had lost all trace of, writes me that, if any of the boys are in St. John, he hopes they will call upon him. He is director of public works.—As some changes of address have come to my knowledge during the year, I note a few: B. L. Beal, 15 Beacon Street, Boston; J. B. F. Breed, 1749 First Street, Louisville, Ky.; John Cabot, 1413 Adams Street, Hoboken, N.J.; R. H. Cushing, St. John, N.B.; G. W. Lewis, 14 Beacon Street, Boston; J. W. Homer, 10 Post-office Square, Boston; Frank Lyman, 88 Wall Street, New York, N.Y. I should be greatly obliged to any one, either a member of '75 or of any of the classes between '72 and '76, who could furnish me with one or more sets of the *Spectrum*. I have a partial set, but would like to obtain a few complete sets, if possible.

1877.

R. A. HALE, *Sec.*, Lawrence, Mass.

The annual dinner and reunion of class of '77, M. I. T., was held at the Technology Club, Boston, February 24, with twelve members present. President F. E. Peabody presided. The following officers were elected for the ensuing year: H. H. Carter, president; C. F. Lawton, vice-president; R. A. Hale, secretary and treasurer. Among those present were John Alden, chemist of the Pacific Mills, Lawrence; Erskine Clement, of the firm of Clement, Parker & Co., brokers, Boston; E. W. Davis, of the

Puritan Press; Edmund Grover, landscape engineer, East Walpole; Walter Jenney, superintendent of Jenney Manufacturing Company, South Boston; R. A. Hale, of the Park Commission, Lawrence; C. F. Lawton, superintendent of Board of Public Works, New Bedford; F. E. Peabody, of Kidder, Peabody & Co.; C. H. Peabody, professor of naval architecture, M. I. T.; A. L. Plimpton, chief engineer of surface lines of Boston Elevated Railway Company; Harry C. Southworth, mining engineer, Stoughton; and B. W. Williston, of the Hancock Inspirator Company, Boston. Letters of regret were read from absent members. Among them was a letter from E. G. Cowdery, a former North Andover boy, who is now general manager of the consolidated gas companies of St. Louis, and is a recognized authority on matters pertaining to the manufacture and manipulation of gas.—A letter of regret was also received from G. W. Kittredge, formerly of North Andover, who is now chief engineer of the C., C., C. & St. L. Ry. (the Big Four Road), with headquarters at Cincinnati. It was voted that the annual meeting should be held the last Wednesday in February, excepting when that day occurs on a holiday, when the first Wednesday in March should be substituted. The after-dinner meeting was quite informal, and a general social time and reminiscences were indulged in with no formal speeches.

1882.

WALTER B. SNOW, *Sec.*, Russell Avenue, Watertown, Mass.

The twenty-third anniversary dinner was attended at the Technology Club, Thursday evening, February 2, by Gerry, Gooding, Herrick, Gardiner, Munroe, W. B. Snow, and Warren.—Strickland was recently in Boston.—Miss Ames's address is now 39 Newbury Street, Boston.—Wood is a member of the executive committee of the National Association of Wool Manufacturers.—Carson's address has been changed to Fourth and Farnum Streets, Davenport, Ia.—Carrie Rice Clark (Mrs. S. P. Clark) is now residing at 137 West Prio Street, Los Angeles, Cal.—Snelling had hoped to

attend the annual dinner, but sent his best remembrances instead. His address is now 1170 Broadway, New York.—J. H. Ross has been abroad again.—Rosing is now mechanical engineer of the Missouri Pacific Railway Company, with headquarters at St. Louis.—Mansfield is first vice-president Westerly Railway and Lighting Company, 52 High Street, Westerly, R.I.—Heins's address is now 30 East Twenty-first Street, New York, N.Y.—The *Outlook* for March 11 contained an article entitled "The Condition of Women in Cuba," by Frederic M. Noa.—Cheney is representative in the Connecticut Legislature.

1884.

PROF. WILLIAM L. PUFFER, *Sec.*, Mass. Inst. of Technology, Boston.

The twenty-fourth annual dinner of the class was held at the Technology Club Feb. 21, 1905; and a very enjoyable time was spent in discussing a good dinner and the many letters from fellows who could not be with us in bodily form, but could in spirit. Doane, Gill, Mellen, Rotch, Tyler, and Puffer were present, and Johnson, C. S. and T. W. Robinson, Boardman, Weston, Holder, Fitch, Ryder, Newell, Mead, Baldwin, Bennett, du Pont, and Purinton all sent letters, most of which arrived in time to be read.—Bardwell was kept at home by sickness, but telephoned to us that he was thinking of the good time we were having.—Chase has been appointed to the position of manager of the Arnold Print Works at North Adams, Mass.—Newell sends a very cheerful letter, claiming that he has too much to do in building dams (?) in the West to get away from work for the sake of a dinner with the class, and finally signs his name as "once of '84, but now of '85."—R. I. P. Newell, get a front seat!—Baldwin heads his letter, in red ink, "Smokeless Operating," and says, "I don't think I could write a letter my classmates could enjoy after dinner." Of course, we all know that the most of us do not smoke, but does B. or not; and, if so, why need it be made so pointed?—Ryder hopes we would have a class dinner at some time when he was not too busy to come. Well, if all hands

would prefer some time other than the regular one, let them write to the secretary, and get it fixed.

1887.

EDWARD G. THOMAS, *Sec.*, 1269 Broadway, New York, N.Y.

The annual meeting of the class of '87 was held at Young's Hotel Tuesday evening, February 21, with President J. A. Cameron in the chair. The meeting was especially well attended, there being present Burgess, Coburn, Carpenter, Cameron, Draper, Gerrish, H. F. Bryant, Lane, Young, Taintor, Souther, Sprague, Kirkham, H. S. Adams, Very, Curtis, Brainerd, H. D. Sears, E. G. Thomas, and the class baby, Robert John Carpenter, now aged sixteen years. After the secretary's report of the last annual meeting was read and accepted, the treasurer stated that, as usual, he had no formal report, but believed that there was a deficit of about $12; and it was concluded to allow him to hold it without further bonds. The president appointed Souther, Bryant, and Taintor the committee to nominate officers for the coming year; and the following were nominated, and unanimously elected: president, H. D. Sears; vice-presidents, F. F. Carpenter and F. G. Burgess. Burgess then spoke from the heart in reference to the loss we had met in Bullard's death; and it was voted that the chairman appoint a committee of three to formulate and carry out a plan for a class memorial for Bullard, and Burgess, Taintor, and Thomas were appointed to serve as this committee. After a report from Bryant in reference to the undesirability of activity in collection of the class fund because of the more pressing subscription for the Technology Fund, a report on the condition of the latter Fund, as well as a statement of the condition of Institute affairs in general, was made by Thomas; and the remainder of the evening was spent in a general discussion of the Tech-Harvard Merger, the necessity for a new location for the Institute, and the desirability of more intimate representation of the former students of the Institute upon its governing body. In connection with the latter discussion the following resolution was passed:—

Resolved, The class of '87, Massachusetts Institute of Technology, respectfully urges the Corporation of the Institute to consider a suitable modification of its organization to secure the representation of the former students of the Institute upon the Corporation by members of that body elected directly by the alumni.

The class desires to record its belief that the welfare of the Institute will be promoted by such closer relation between the Corporation and the strong and loyal body of men to whom the Institute has given her training.

Voted, That a copy of the above resolution be sent to President Pritchett, with a request that it be laid before the Corporation of the Institute.

Guy Kirkham, the author of the '87 class song, furnished an interesting souvenir of this dinner in a neat folder containing the words of our song, and bearing on the cover an enlarged view of the old "Society of '87" pin in its true colors.—Lyman Farwell writes that Felix Howes Farwell is now ten months old, and has climbed upstairs twice, has a mouth arranged like a Pullman car,—that is, has two uppers and two lowers,—and apparently is much struck with his father.—William H. Brainerd was one of twelve architects invited to submit designs for the New National Shawmut Bank Building, Boston.—Gelett Burgess acknowledges that he will publish an anarchistic novelette in one of the spring numbers of the *Smart Set*.—H. Q. Emery, who is on the stage with the May Fiske Company, has been furnished with a list of the addresses of the class, and hopes to find time to call on many of those in the cities in which his company plays.—R. E. Schmidt has just been successful in a competition for a $500,000 hospital building, and expects the present year to be the best ever.—W. T. Sears is now secretary of the Engineering Bureau of the Niles Bement Pond Company in Philadelphia, Pa.—Vose is still wholly disabled with the rheumatism, but can still read and write, and will welcome letters from all of us; and the secretary hopes that many of us will take the trouble to write him.—C. P. Smith is engineer with the Committee of Twenty National Board of Underwriters, 135 William Street, New York.—Mosman should now be addressed in care of El Paso Smelting Works, El Paso, Tex.—Sever has been appointed by Mayor McClellan, of New York, one of a commission of three to draw up plans and

specifications for the Municipal Electric Light and Power Plant for lighting the streets, parks, public places, and all public buildings of the five boroughs of New York City.

1888.

WILLIAM G. SNOW, *Sec.*, North-west Corner Broad and Wallace Streets, Philadelphia, Pa.

Arthur W. Jones returned several months ago from Australia, where he has been located for a number of years as a representative of the General Electric Company. He writes that he has been able to arrange to remain in this country. His present address is Schenectady, N.Y., care of Foreign Department of the General Electric Company.—Leander T. Safford is with the France Packing Company, Incorporated, Tacony, Philadelphia, Pa.—Your secretary, who is also vice-president of the Technology Club of Philadelphia, attended the dinner of that organization on March 6, at which President Pritchett was the guest of honor, and delivered the principal address.—The secretary regrets to state that a report has reached him of the death of Ralph Morse Fay, of Chicago. Details are lacking.—The junior department of the class has two new members,—a son in the family of Walter K. Shaw, and a daughter in that of William G. Snow.

1889.

PROF. FRANK A. LAWS, *Sec.*, Mass. Inst. of Technology, Boston.

During the last summer a memorial gateway was erected at Bowdoin College by the class of '78, of which Professor Burton of the Institute is secretary. The design was furnished by Kilham & Hopkins. The gateway carries on the tablet the Bowdoin coat-of-arms, and an appropriate inscription regarding the members of the class. The central arch carries the seal of the college.

That the design is a most pleasing one is shown by a very attractive souvenir postal card. Concerning the competition held by the Salem High School Commission the Boston *Herald* makes the following statement:—

The design of Kilham & Hopkins, of this city, for the Salem High School, has been named by Professor Francis W. Chandler of the Massachusetts Institute of Technology, the expert appointed by the Salem High School Commission to examine the sixteen competitive plans submitted by prominent Boston and Salem architects; and the commission has accepted Professor Chandler's report.

The building, which will be of colonial architecture, will be about 150 by 240 feet, three stories and basement high, and will contain class-rooms, laboratories, etc., for more than 800 scholars. There will be an assembly hall on the ground floor, with 1,050 separate chairs, unusual exit capacity, and so arranged that it can be used by the public without opening the rest of the building. The plan is symmetrical, all of the elevations being of pleasing design, and is especially adapted to the irregular plot. The basement provides luncheon, bicycle, toilet-rooms, etc.; a gymnasium, 20 feet high, and fitted with a running track of 20 laps to the mile.

The working parts of the building will be arranged to give the greatest ease of administration and greatest economy of coal consumption.

The cost is estimated at about $175,000.

An important feature of the design is that the main building, exclusive of the assembly hall, can be built without disturbing the present school building, so that the question of accommodating the scholars during construction is provided for.

—Kilham was one of the lecturers in the Free Public Course given at the Boston Public Library, his subject being "Brick Architecture of Northern Italy."—Hollis French writes:—

At the present time we are making plans for a water power development, where we expect to install five 1,000 horse power units. The novel feature about the plant is the adoption of the vertical shaft turbine, which has not been used to any great extent in America on low heads. We have worked out a scheme, however, which will not only be economical, but which presents many other advantages over the usual horizontal wheels. We are also designing three power stations for the developing of electric power by steam, in two of which we propose to use the steam turbines.

An important part of the instruction given to the fourth-year students is by excursions conducted by the various departments of the Institute. The advantage to mature students of seeing and studying the practical operation of their profession cannot be overestimated. Thorp, who had charge of the Summer School of Industrial Chemistry, has been good enough to furnish a most interesting account of its work. One thing is especially to be noted; that is, the cordial reception accorded the school and its instructors at the various plants visited, showing conclusively that the Institute is appreciated, and at its true value, by those who know what it is accomplishing and who are in a position to judge of its work.

THE SUMMER SCHOOL OF INDUSTRIAL CHEMISTRY OF 1904

On the evening of June 8 last a party of twelve students started on a two weeks' tour of Central New York, for the purpose of visiting factories and chemical works. Three were from the class of '04, eight from '05, and one special.

Our first stop was at North Adams, where we visited the Arnold Print Works in the morning of June 9. We were shown the entire process of bleaching and preparing the cloth for the printer, and the numerous operations of printing and finishing the calico. The exceeding accuracy and delicacy of the work of engraving the copper print rolls, which carry the various colors and designs, was most interesting; and we left that department reluctantly. In passing through the color shop, we met Busby, '97, who had just returned from the alumni celebration in Boston the day before. With this company are also Williams, '95, and R. L. Chase, '84, as manager; but they had not returned from the Boston meeting. The pleasure of our visit to this plant was largely due to the evident welcome extended to us by Dr. Lichtenstein, the chemist, and the superintendent.

After dinner a tally-ho was chartered, and the party, re-enforced by student Walter Burns, '05, had a most delightful drive of six miles through the hills back of North Adams to the Stamford Chemical Company's plant at Stamford, Vt. Here we were most cordially received by Messrs. Wilmarth and Frame, proprietors of the works, who introduced us to all the mysteries of distilling wood and the preparation of charcoal, with recovery of wood alcohol and manufacture of calcium acetate. The plant was in process of reconstruction, several novel ideas of the proprietors being in-

stalled; and we had an excellent opportunity to see certain details which are usually concealed by brick work and heat insulating coverings. Returning to North Adams, we made an interesting detour to a natural gorge and pot-holes cut out by a little stream.

An early start next morning brought us to Mechanicsville, N.Y., where we inspected the Duncan Mill of the West Virginia Pulp and Paper Company. The superintendent, Mr. Duncan, and the chemist, Mr. Martin L. Griffin, afforded us every opportunity to examine the plant. Pulp is made here by the soda and sulphite processes, and converted into book and magazine paper. The output of these mills is about 35 tons of soda pulp and 30 tons of sulphite pulp, which, with the necessary loading materials, make about 75 tons of paper per day. In the afternoon our party proceeded to Ballston, N.Y., to the tannery of the American Hide and Leather Company. Only green salted hides are used, and 2,100 sides of leather are turned out daily. The various operations of the beam-house, tannery, and finishing, were all carefully explained by Mr. H. V. Haight, the superintendent, and the head tanner; and, as we left, each member of the party was presented with a razor strop as a memento of the visit.

Our next move was to Glens Falls, where we arrived late in the evening, thoroughly tired. Next day we inspected the plant of the International Paper Company, making ground wood pulp and newspaper. At that time the entire output of the mill was furnishing a part of the supply for Hearst's New York *American*. About 48 tons of pulp were made daily, and this was mixed with some 20 per cent. sulphite pulp from another mill of the company, and about 10 per cent. filling clay was added. The plant is operated in part by turbines, using the water power from the falls. At this plant we were met by Mr. de Roode, chief of the testing department of the company, and Messrs. Kendall, '98, and Moody, '05, from the laboratory. On our return several of the party visited the falls and the cave, famous as the hiding-place of the hero of Cooper's "Last of the Mohicans." In the afternoon some of the men went to the great dam and power-house of the Hudson River Power Company at Spiers Falls. The others, including the writer, inspected the splendid new plant of the Union Bag and Paper Company at Fenimore, N.Y., where we again saw wood pulp making by the sulphite process, through the courtesy of Mr. Robert Wolf, the superintendent. A more complete and up-to-date plant would be hard to find. The bisulphite liquor is prepared by the tower absorption process. We ascended to the roof of the tower building some 250 feet, and the view of the beautiful river valley will long be remembered.

Sunday, the 12th, was one of the perfect days in June, celebrated in poetry; and our entire party improved the opportunity to go to Lake George. The ride by trolley from Glens Falls is through a country of romantic and historic interest to the Fort William Henry House, on the lake. The hotel was not open; but a steam launch was at hand, which took us down the lake as far as Black Mountain, winding in and out along the shore, into Paradise Bay, and returning by the Sagamore and other noted resorts of this beautiful region.

Monday we got an early start for Syracuse. A short stop at Saratoga enabled some of the boys to sample the waters of those famous springs. A few miles out of Schenectady we were pleased to meet Professor W. R. Whitney, '90, going to his laboratory at the plant of the General Electric Company. At Syracuse we were joined by Professor W. H. Walker, who continued with the party for a week. Here we saw the making of salt by solar evaporation at the yards of the Syracuse Solar Coarse Salt Company, and also at a salt block, where the boiling process was in operation. Numerous photographs were secured on this trip.

Next day the works of the Empire Portland Cement Company at Warners claimed our attention, the manager, Mr. Charles Lockhart, accompanying us from Syracuse. The clay pits and marl beds were inspected and photographed; and the works were examined, the great pebble mills and rotary furnaces attracting special attention. About 600 barrels of cement were turned out daily at this plant. After lunch the Sanderson Mills of the Crucible Steel Company of America were visited, under the guidance of Dr. J. A. Mathews, chief metallurgist. The mixing and melting of various kinds of steel, the rolling of bars and rods and drawing and straightening of wire, were extremely interesting, the manual dexterity of the operatives being a matter of admiration to all. A regenerative furnace in process of construction afforded us a fortunate opportunity to examine the interior of this type of furnace. Next we stopped at the works of the Straight Line Engine Company, on the invitation of Mr. John E. Sweet, president of the company. Some remarkable pieces of large loom casting were noticed, large work of high grade being a specialty of the company.

On June 15 we visited the Onondaga Pottery, through the courtesy of Mr. James Pass, the general manager. The manipulation of the clays and forming of articles by the workmen are never-failing sources of interest; and the operations of firing, glazing, and decorating of the china were all thoroughly shown and explained. A long but pleasant railroad ride during the afternoon brought us to Olean late at night.

Next day we visited the works of the Vacuum Oil Company, accompanied by Mr. F. M. Baxter, chief chemist of the company. The distilling of crude petroleum and purification of the burning oils, naphtha and kerosene, and the separation of the paraffin from the heavy lubricating oils, was shown here; also a plant for the recovery of spent acid from the purification of the burning oils. This plant was very large, and several excellent photographs were made by some of the party. The heavy oils from here are shipped to the Rochester works of the company, where they are bleached, mixed, and compounded with animal and vegetable oils, to produce lubricants with certain characteristics. We saw this plant later while in Rochester. In the afternoon most of the party took the trolley for a delightful ride over the hills, eight or ten miles, to Rock City. This is an old oil field, and, standing on a cliff at one point, we counted ninety-eight derricks in sight. We saw the working of the pumps at many old wells, and visited one new well just put into operation. The natural formation around Rock City is very picturesque, and cameras were in frequent use. Early in the morning of June 17 we started for Silver Springs, to see the works of the Worcester Salt Company. A lay-over of a couple of hours at Portage gave us a chance to enjoy the natural beauty of the falls of the Genesee River. The viaduct of the Erie Railroad across the gorge of this river here is a fine example of bridge building, and its 230 odd feet above the river afforded opportunity to test the steadiness of our nerves in looking down while crossing it. At Silver Springs we were taken in charge by Mr. Powel, the manager, and Mr. Nash, assistant manager, of the salt works. We saw fine grades of salt produced by the grainer process and by vacuum pan evaporation. This is a most systematically arranged and equipped works, mechanical appliances and automatic methods of handling material being used whenever possible. The brine is procured by drilling into the salt beds, 2,100 feet below the surface, pumping water down to be saturated, and then drawing it up. It needs very little purification. We spent the greater part of the day here, and at noon were entertained by the company in the village hotel. We went away with the pleasant conviction that we had been especially welcomed.

Our first morning in Rochester was spent at the works of the Vacuum Oil Company, where Mr. Everett, the vice-president of the company, welcomed us, and Mr. Baxter and his assistants kindly showed us how lubricating oils are prepared and tested. We also visited the Rochester Glass Works, where we were courteously received by the proprietor, Mr. T. E. Reed. Bottle-blowing and the construction and working of a tank furnace

were seen here to great advantage. Cigars having been given to those partial to the "weed," we passed into the works, and were able to see the blowing at close range. When leaving, each member of the party was given a cane, made of clear amber-colored glass, as a memento of the visit.

On Sunday, June 19, we were the guests of the staff of the Eastman Kodak Company. They called for us early in the afternoon with a large tally-ho, and for five hours we rode about the parks, residence streets, and showplaces of Rochester, finally stopping at one of the summer resorts on the lake, where a fish and game dinner was served. Following this, the party took possession of the casino, and for an hour or two familiar Tech and other college songs were sung. A beautiful moonlight ride back to the city closed this, the most delightful day of the trip. We were pleased to renew acquaintance with Lovejoy, '94, manager of the works, Cole, '91, Haste, '96, Tozier, '96, Fifield, '99, and Sulzer, '01.

Next day we visited the Eastman Company's works at Kodak Park, a beautiful suburb. Before entering, we lined up with the overseer staff, and were photographed in a group on the lawn. Then, guided by Mr. Lovejoy, assisted by the superintendents of the several departments, the various operations of photographic film and paper-making were shown to us. This was most instructive, the passing through the film-room being a novel experience, though we could not see very clearly in the dim red light what the operatives were doing. Next the company served us with luncheon on the lawn, under some very beautiful trees, after which the finished photographs were given us that had been taken on our arrival.

We next visited the factory of Curtice Brothers, who prepare canned goods. Although not the busy season, the plant was very interesting, the machines for making cans and caps for bottles attracting much attention. On leaving, each was given a sample bottle of catsup and a small jar of preserved fruit. Across the street is the huge plant of the Bartholomay Brewery Company, where we were cordially received by the secretary, Mr. Bradly, and Mr. Cornelius, the head brewer. We were shown the plant from the malt storage and mash rooms to the racking off and barrelling room. Connected with this we saw the manufacture of the artificial ice used for icing the shipping cars.

Next morning we went to the works of the Pfaudler Company, manufacturers of enamelled steel tanks for brewers' use, water storage, etc. The mechanical operation of building the tank, flanging and bending the plates and welding the joints, were carefully observed, as well as the sand-blast cleaning of the surface and baking of the enamel. We left Rochester about

noon for Buffalo, and after luncheon visited the works of the National Battery Company, seeing there the making and charging of storage batteries for automobiles, etc.

Tuesday, the 22d, was spent in the immense plant of the Lackawanna Steel Company at South Buffalo. When completed, this will be the largest in the country. It was especially a pleasure to the writer to find S. B. Sheldon, '89, in charge there as general superintendent. At the time of our visit the coke ovens, blast furnaces, converters, and rail-mills were in operation, and the open hearth and bar mills in process of construction. The extensive installation of gas engines was notable, the blast furnace gases being used to drive the blowers. Each engine is of 2,000 H. P.

Wednesday morning we saw the large plant of the Larkin Soap Company, with all its various departments for laundry and toilet soaps, glycerine and perfume. In the laboratory we found Saunders as chemist. We next went to the Buffalo Pottery Company, where work similar to that at Syracuse was seen. Transfer paper from copper-plate work is used here in the decoration of the china. We then visited the Atlas Works of the Standard Oil Company, where we saw the distillation and refining of petroleum and the preparation of paraffin and lubricating oils. Mr. H. P. Chamberlain, general manager, took a personal interest in our visit, and made numerous inquiries concerning the Institute and its work.

At the Buffalo Smelting Works, on June 24, we saw the refining of copper from Lake Superior. Mr. Maurice B. Patch, '72, superintendent, was unfortunately absent at the time of our visit; but he had made arrangements for our coming. The poling and flapping of the melted copper, the automatic casting of pigs, and the extensive electrolytic refining plant were especially interesting. Then we went to the varnish works of the Pratt & Lambert Company at Black Rock. Mr. W. H. Andrews, the general manager, accompanied us through the works, as did also the chiefs of the various departments. The crude resins, oils, etc., were shown, and samples of the various kinds were offered us. "Gum" melting and mixing and oil "boiling" were seen in detail, also the preparation of enamels and driers. We were then conducted to the testing laboratory, where each head of a department gave us a short talk on the materials and processes he employs in his work. After this we were given a sumptuous dinner as guests of the company, and each was presented with a key-chain, bearing a registered number and return address. On leaving, we indicated our appreciation of our reception by the usual Tech yell for the company and its manager.

June 24, the last day of our trip together, was spent at Niagara Falls. At the works of the Natural Food Company we saw the ingenious mechanical processes for making shredded wheat and "triscuit," and the baking of these in automatic furnaces, some of which are electrically heated. After a few minutes' chat with Mr. E. F. Olmsted, the local manager, we were invited to sample a palatable luncheon of the factory products, with strawberries and cream.

Next the great power-houses of the Niagara Falls Power Company were visited, and the immense turbines and generators inspected. Also the small experimental laboratory of the Niagara Falls Research Company, where processes are developed and experimental facilities offered to inventors and investigators. Unfortunately, none of the electro-chemical industries were open to us, but we looked about a little, and got some idea of their development. The rest of the day was spent in viewing the sights of the Falls and the gorge. On our return to Buffalo that night the party disbanded after a final conference.

Throughout the trip the members of the party were expected to carefully observe the details of the processes and appliances shown to us, and at night we held a general conference, attended by all, at which notes were written up and comments and explanations called for and given by the students upon what they had seen during the day. During the whole time the interest on the part of the students was well sustained, and the school appeared to be a success. The trip lasted sixteen days, including Sundays; and, in all, twenty-eight different plants were visited.

F. H. Thorp.

1891.

Howard C. Forbes, *Sec.*, 4 State Street, Boston, Mass.

Frederick C. Moore has been made superintendent of special risks and inspection department for the Hartford Fire Insurance Company. This position corresponds to the position that Henry A. Fiske holds with the Phœnix Insurance Company. The following item appeared in the Hartford *Times* on Oct. 27, 1904, in reference to this appointment:—

In order to properly care for an increasing amount of protected business, and to better provide for the inspection of certain other important classes,

the Hartford Fire Insurance Company will on November 1 establish a special risk and inspection department, in charge of Frederick C. Moore, who has for the past eight years been connected with the Factory Insurance Association in various engineering and underwriting capacities. Mr. Moore is a graduate of the Massachusetts Institute of Technology; and, having had a long and thorough training as inspector and engineer, he is particularly well equipped to handle "sprinklered business" and to pass upon all questions relative to protection and construction, which are commonly grouped under the designation of fire insurance engineering. He has also made a careful study of the hazards of manufacturing risks. He will have entire charge of certain classes of business with the Hartford, and will also act as consulting expert in all cases where technical advice is required.

—An informal meeting of the class was held at the Technology Club on Monday evening, December 5, for the purpose of discussing matters relating to the Technology Fund. The guests of the evening were Mr. James P. Munroe of the Corporation, and Professor Harry E. Clifford, the head of the Department of Electrical Engineering. After the dinner Mr. Munroe spoke upon the life of William B. Rogers, and Professor Clifford spoke on Institute matters. About twenty were present.—James W. Pierce is now connected with the Boston Incandescent Lamp Company. The business of this company is to purchase burned out electric lamps, and to replace the old filaments with new ones. A good lamp is thus obtained, having a light and efficiency equal to the old one, at a very much reduced cost.—The annual dinner will be held some time about the first of June. Notice will be sent later.

1893.

FREDERIC H. FAY, *Sec.*, 60 City Hall, Boston.

The annual class meeting and dinner will be held on graduation day, Tuesday, June 6, 1905. In company with other classes, and continuing the custom inaugurated by '93 and '98 two years ago, class headquarters will be open throughout the afternoon, where

our members will assemble, and where members of other classes will be cordially welcomed. Following the dinner, which will be held at a suitable hour, the class will participate in the annual "Tech Night Pop Concert," arrangements for which are well advanced under the direction of L. W. Pickert, '93, to whose admirable management the unparalleled success of last year's "Tech Night" was largely due. Notices of the annual meeting will be sent out at the proper time.—The second and third informal class dinners of the season were held at the Technology Club on Saturday evenings, February 4 and March 18, 1905. At the first our guest was Bursar F. H. Rand, of the Institute, who accompanied the class and assisted in our stunt at the memorable Nantasket excursion of the Tech Reunion. Mr. Rand gave a talk upon the administration of the Institute's finances, particularly with reference to the purchase of supplies, which was instructive and full of interest. At the second meeting, after dining at the club, the members adjourned to the Tech Union, where, with Ike Litchfield, '85, as its guest, the Sophomore Class was that evening doing its "annual stunt." '93 announced its presence with the old class cheer, which was warmly responded to by the undergraduates. Although the program was finished just as we entered, '07 very kindly repeated a number for our benefit, after which '93 was introduced, individually, to the company by President Dawes as master of ceremonies. Remarkable to relate, every '93 man, including the bashful principal of the Lowell Textile School, responded to his introduction by a speech. For an hour '93 and the undergraduates joined in tuneful (?) melody from the Tech Song Book, when some one started the cry, "To Rogers steps!" Thereupon the whole company, to the number of one hundred and twenty-five, formed in column of twos, and to the accompaniment of college yells and songs marched down Huntington Avenue to the Rogers Building, '07, with visions of the police riot fresh in mind, kindly allowing Litchfield and '93 to head the procession. On the way, greetings were exchanged with a party of Dartmouth men who were dining at the Nottingham. Without molestation from the police the fellows assembled on Rogers steps, where more cheering and more songs ended an evening which brought vividly to mind

memories of our own dear old undergraduate days.—Charles V. Allen, who has been connected with the Westinghouse Electric and Manufacturing Company for many years, first at Pittsburg and later at New York, has been sent by that company to the City of Mexico, where he expects to remain for some time. His address is Cadena 19, Mexico City, Mexico. Allen went to Mexico last November, remained a month, and returned to New York for a few weeks. He went back again to Mexico in February.—Frank S. Badger's address is 1210 Braly Building, Los Angeles, Cal., where he is assistant engineer to Samuel Storrow, '90, who is resident engineer of the Washington and Oregon Power Company (Milton, Ore.).—Frederic W. Baker is constructor for the Lake Torpedo Boat Company at Newport News, Va.—Minard T. Barbour, who is connected with the Otis Elevator Company, is now located at the Railway Exchange Building, Chicago.—J. Winn Brown, for a number of years connected with the publishing house of Silver, Burdett & Co., has been transferred to their New York office at 85 Fifth Avenue. His home address is 103 Waverly Place, New York City.—Charles E. Buchholz is connected with Irish Brothers, miners and shippers of anthracite and bituminous coal, at the West End Trust Building, Philadelphia, Pa.—Thomas I. Chapman is in Japan, where he has been engaged in teaching. His address is Tokyo Club, Tokyo, Japan.—In the issue of the *Engineering News* of March 23, 1905, there appeared a two-page article describing the Baltic Stamp Mill at Redridge, Mich. This mill, which was designed and erected by its superintendent, Frederick G. Coggin, '93, handles the rock from the Baltic copper mine, crushing it and washing out the copper. Its capacity is twenty-four hundred tons of rock per twenty-four hours, and it is said to be typical of the modern milling plants and a good example of modern stamp mill design.—Nathaniel R. Craighill is with the General Electric Inspection Company, 114 Liberty Street, New York City.—George Guppy, architect, has moved his office to 22 Congress Street, Boston.—Frederic W. Hadley is manager of the Atlantic Water and Electric Power Company, Morgan Falls, Ga.—George M. Hawes, formerly of Fall River, Mass., is engaged in manufacturing at 700 Delaware Avenue, Kansas City,

Mo.—Arthur H. Jameson is superintendent of the Providence Steel Casting Company. His house address is 1 Rhode Island Avenue, Providence, R.I.—Willis T. Knowlton has a position in the office of the city engineer of Los Angeles, Cal.—John W. Logan is connected with the Alan Wood Iron and Steel Company, 519 Arch Street, Philadelphia, Pa.—George E. Merrill is vice-president of the Noel Construction Company (of Eutaw and McColloh Streets. Baltimore). He is still at Annapolis, Md., where for some time he has been engaged in the construction of new buildings for the United States Naval Academy.—Henry A. Morss is out again after an illness of typhoid fever lasting more than four months. About the middle of March he went to Florida to recuperate.—Joseph C. Noblit was in Boston for a few days in March on a business trip for the International Company of Columbus, Ohio, of which company he is district manager, with headquarters at 56 Fifth Avenue, Chicago. After May 1 he will be at the home office of the company at Columbus, and during the coming summer he expects to make a business trip to England.—Henry L. Rice is general manager of the Western United Gas and Electric Company, Aurora, Ill.—Elwyn W. Stebbins, mining engineer, is a member of the firm of Janin, Stebbins & Smith, consulting engineers, Nevada Block, San Francisco, Cal.—The marriage of Miss Caroline Tileston Hemenway and Charles Wilson Taintor occurred on Wednesday, Jan. 18, 1905, at the home of Mrs. Charles P. Hemenway, 242 Beacon Street, Boston. Mr. and Mrs. Taintor expect to remain in Boston or vicinity, Taintor having severed his connection with the General Electric Company in order to go into the banking business with the firm of William A. Read & Co. (the reorganized firm of Vermilye & Co.) at 43 State Street, Boston.—The address of H. H. Thorndike is 33 West Forty-eighth Street, New York City.—Winthrop L. Tidd is with the William A. Chapman Company, 614 Industrial Trust Company Building, Providence, R.I.—S. P. Waldron's address has recently been changed to care of American Bridge Company, 42 Broadway, New York City.—Charles R. Walker is with the Celluloid Zapon Company, his address being 711 Pacific Street, Stamford, Conn.—S. Edgar Whitaker has moved

to Portland, where he is engaged in electric railway work, his address being (appropriately) 93 Exchange Street, Portland, Me.

1894.

PROF. SAMUEL C. PRESCOTT, *Sec.*, Mass. Inst. of Technology, Boston.

J. C. Perry died of consumption at La Junta, Col., Aug. 31, 1904, after an illness of two or three years, most of which time he spent in New Mexico, in the hope of recovering.—Charles H. Paul has a position in the United States Reclamation Service, and is located at Denver, Col.,—W. H. King, Course IX., has been appointed assistant corporation counsel in the law department of the city of New York.

1895.

WILLIAM T. HALL, *Sec.*, Mass. Inst. of Technology, Boston, Mass.

The class of '95 will regret to hear that George W. Hayden has felt obliged, on account of the pressure of business duties, to resign from the secretaryship of the class. He writes:—

> I am so situated that I cannot give the proper attention to a secretary's duties. . . . Ordinarily, the duties are not arduous; but, of course, they will be somewhat heavier this spring than usual on account of its being our decennial year.

On March 29 President Azel Ames, Jr., who is now signal engineer for the Lake Shore & Michigan Southern Railway, and resides at Cleveland, Ohio, followed suit and sent in his resignation. E. L. Hurd has been chosen to serve in his stead. Ames has been president of the class since 1897.—By the time the April number of the TECHNOLOGY REVIEW is in press, steps will have been taken toward preparing a decennial catalogue and class-book. The preparation of this catalogue will require considerable co-operation on the part of the individual members of the class.—Two days after

the writer received notice of his appointment as secretary by the executive committee of the class, he received notice that copy was desired at once for the REVIEW. He hopes that another time he will be better prepared.—Our assistant in the chemical laboratory has studied under S. L. Bigelow at Ann Arbor, Michigan; and we learn with pleasure that Bigelow is immensely popular with his students. Recently Professor Prescott, who was the director of the chemical laboratory at Michigan, has died; and, among others, Bigelow has been mentioned as a possible successor.—It seems natural to see George Defren about the Institute once more. He is doing research work with Professor A. A. Noyes.—We met Walter Phemister on the street recently. He is very busy selling insurance for the New York Life. He said he hadn't even found time to read *Everybody's Magazine*.—H. W. Hayward is just recovering from a severe attack of lumbago, which prevented him from attending to his work here at the Institute during the greater part of the first term.

1896.

EDWARD S. MANSFIELD, *Sec.*, 70 State Street, Boston, Mass.

C. G. Hyde, assistant engineer in the Filter Department of the Board of Public Works at Harrisburg, Pa., has accepted the position of assistant professor of sanitary engineering in the University of California, where he is to develop a course in sanitary engineering. His active connection with the university will begin with the next fall term. During the month of March he completed a tour of various cities, including Columbus, Pittsburg, New York, and Boston, looking up matters in connection with the establishment of the new course. Mr. Hyde will also devote a portion of his time to consulting work on filtration and kindred sanitary matters in the West.—F. E. Field, engineer with Chapin & Knowles, civil and consulting engineers of Pittsburg, Pa., has charge of the construction of the Pittsburg filters,—an enterprise to cost about $3,500,000.—M. L. Fuller, in connection with his work as chief of the section in charge of artesian water investigations in the Eastern

United States for the Geological Survey at Washington, has recently been called upon to furnish plans for the organization of a similar bureau in Brazil. This is the second South American country which within a year has applied to the government for assistance in this branch of the work, the first being Peru, to which country an expert was sent to organize work on the recommendation of Mr. Fuller.—Mrs. Grace A. Van Everen Stoughton died in New York in January, 1905, after undergoing a critical operation. Mrs. Stoughton was graduated from Adelphi Academy, Brooklyn, New York, in June, 1893. She studied chemistry and mathematics the following year at Barnard, and entered the Massachusetts Institute of Technology in September, 1894, taking her degree in June, 1896. She was one of the ten teachers appointed as the original faculty of the Erasmus Hall High School in Brooklyn, N.Y., when it opened in September, 1896, being connected with the scientific department, where she taught physical geography, physiology, and zoölogy. She wished to resign in September, 1898, but consented to remain until her successor could be appointed. Owing to the difficulty in filling her place, it was necessary for her to continue this work until October, 1898, when Dr. R. E. Call was appointed. She took a course in invertebrate zoölogy at the summer school at Wood's Holl, Mass., in the summer of 1897, and also took a correspondence course in sanitary science at Chicago University. In February, 1903, she passed the civil service examination, and was soon after appointed to the position of bacteriologist by the New York Department of Health, which position she held until the time of her death. During the last month of her life she prepared a paper on the pollution of the water supply of New York City, entitled "Concerning the Characteristics of Colon Bacilli and the Value of the Presumption Test," which was read at the annual convention of the American Public Health Association, Laboratory Section, which met at Havana, Cuba, Jan. 9, 1905. Her work was of great promise, for to an energy and enthusiasm were added a clear brain and great tenacity of purpose.—W. M. Andrew, formerly with the General Electric Company, and located at Cincinnati, Ohio, is now associated with the Canadian Westinghouse

Company, King and Yonge Streets, Toronto, Ontario.—George F. Ashton has been appointed city engineer of Salem, Mass.—R. E. Bakenhus, civil engineer in the United States Navy, has been transferred from the Naval Training Ship at Newport, R.I., to the navy yard at League Island, Pa.—George S. Bowes is superintendent of the Open Hearth Furnaces of the Page Woven Wire Fence Company at Monessen, Pa.—George Fresch, Jr., has given up the Western agency of the Vulite Syndicate of London, and is now a grain merchant in St. Louis, with an office at 101 Chamber of Commerce. —M. S. Jameson has been promoted to the position of assistant engineer with the New York, New Haven & Hartford Railroad, and has been transferred to New Rochelle, N.Y.—W. O. Pennell is connected with the Missouri and Kansas City Telephone Company at Kansas City, Mo.—F. F. Schaller has accepted a position as draughtsman with William T. Wood & Co., Arlington, Mass.— F. H. Smith has left the Boston Woven Hose and Rubber Company, to become assistant superintendent of the Fisk Rubber Company at Chicopee Falls, Mass.—Meyer J. Sturm, architect, 84 La Salle Street, Chicago, and Dr. A. J. Ochsner, surgeon in chief of Augustana and of St. Mary's Hospitals, Chicago, associated, have been awarded the first prize, gold medal, at the World's Fair, St. Louis, for hospital plans exhibited by them. The exhibit was entered under Charities and Correction, and consisted of complete plans of four hospitals: a Hospital for the Treatment of Contagious Diseases, a Hospital for Cities, a Hospital for Towns, and a Gynecological and Obstetrical Hospital. The Hospital for Contagious Diseases is especially noteworthy, as it is a radical departure from the old style pavilion plan, and treats all diseases in one building by a very unique and clever floor arrangement. Mr. Sturm was the assisting architect for the New Augustana Hospital, Chicago, and has planned many other structures of similar character. Dr. Ochsner has frequently read papers on the subject of hospital construction, having given much time and attention to the development of his ideas, gained from a practical knowledge of the needs of such institutions. In conjunction with Mr. Sturm, he has written many treatises on hospitals, which have been published in the

leading medical journals.—H. V. von Holst, who has lately returned from an extensive travelling trip, has opened an architects' office in the Rookery Building, Chicago, Ill., and is also instructor of architectural design in the Armour Institute of Technology.—J. Lloyd Wayne has been appointed foreman of the equipment division of the Central Union Telephone Company, and has his headquarters in the Majestic Building, Indianapolis, Ind.—Charles S. Newhall was married to Miss Ada Belle Story on Wednesday, Jan. 18, 1905, at Ouray, Col. They are now living in Maconi, Queretaro, Mex.—The following letter, dated March 4, was rereceived from A. E. Zapf:—

As secretary of the North-western Alumni Association, I wish to notify you of the death of D. C. Schofield, Cleveland, Ohio, who was killed in a railroad accident March 3. Schofield was lieutenant of Company D, which was on its way to the inauguration at Washington. The train was telescoped near Pittsburg, and a large number were killed and injured. Schofield was a '95 man, Course IV., and a member of the Delta Upsilon Fraternity. He was a thoroughly fine fellow, and was just getting nicely started in his professional work with his father and brothers at Cleveland.

James Buist Henderson, who died March 4th, was born in Dundee, Scotland, on the 14th of August, 1875. His early schooling was in Yorkshire, England, until his family moved to this country in 1886, and settled in Ludlow, Mass. He attended the common schools of that town, and pursued his studies so diligently that he was admitted to the Massachusetts Institute of Technology in 1892, before he had reached his seventeenth year. As a boy, he was quiet and rather reserved, but fond of football and cricket, and a great favorite with his teachers as well as with his schoolmates. At the Institute he devoted himself to his work, attacking each subject with energy and persistence until it was mastered. He continued his interest in athletics, taking part in various track meets. In his Senior year he secured an opportunity on the engineering staff engaged in the extension of the New Bedford Water Supply, and after graduation he went to a similar position with the Metropolitan Water Board at Clinton.

He went to the Boston Woven Hose and Rubber Company in 1898. Here, as elsewhere, his work was characterized by the same quiet earnestness and thoroughness shown from boyhood. For some years he worked in

the cost department on the costs and the specifications which control the manufacturing operations of the company. In 1902, after the death of Mr. Robert Cowen, the technical manager and the founder of the company, he was placed at the head of the technical department.

In this capacity he had charge of the compounding of rubber stocks and of the large amount of experimental work which this process entails. His success in this work was marked, being evident in the improved value, quality, and uniformity of the product.

He was married in Swampscott in 1901 to Miss Marion E. Lowd, and lived in Cambridge until he moved to Arlington in 1903. It was while his house was building that his disease, diabetes, declared itself. He made a gallant struggle for life and health; but his strength failed, until the end came suddenly on the 4th of March. During all this time he kept at his work, though with gradually lessened hours and decreased responsibility.

He died at his parents' home in Ludlow, where he had gone on a vacation urged on him by the management of the company.

The expressions of grief and sympathy for the bereaved wife and two little children, and for the stricken parents and sister, were extraordinarily numerous and heartfelt. The flag at the factory was half-masted, and the greatest concern and regard was expressed by his associates. One of the compensations of this terrible trial to his family has been the universal testimony of those who knew him to his sterling worth. His business associates, particularly, have been deeply impressed by the absolute integrity and devotion to duty which accompanied his courteous and unassuming demeanor.

A. S. H.

1897.

JOHN A. COLLINS, Jr., *Sec.*, 74 Saunders Street, Lawrence, Mass.

A daughter, Eleanor Caroline, was born to Mr. and Mrs. Arthur T. Hopkins on Feb. 3, 1905.—T. C. Atwood has gone to Pittsburg for work with the Filtration Bureau. He was formerly with the Torresdale Filter Plant at Philadelphia during its construction.—Barrows, Course X., who since graduating, until recently, has been assistant examiner at the Patent Office, is now with the patent department of the United Shoe Machinery Company.—Brainerd, Course I., is bridge designer with the Barge Canal Offices at Albany.

—It may not be generally known that H. M. Deavitt, Course V., is the consulting chemist for the Liquozone Company of Chicago, whose celebrated product is being so widely advertised throughout the country.—A. S. DeWolf, for several years a teacher at the Haverhill Manual Training School, is now with the Hyatt Roller Bearing Company, Harrison, N.J.—C. H. Eames is secretary of the Lowell Textile School.—H. B. Hunt, Course II., is assistant mechanical superintendent with the Erie Railroad at New York.—Maguire, Course VI., is with the United States Reclamation Service at Denver, Col., as electrical engineer.—Marshall is interne at the Johns Hopkins University Hospital.—Hugh Orr, Course IV., is a member of the firm of Orr, Wight & Churchill, at 101 Tremont Street, Boston.—Potter, Course III., is the manager for Mexico of the Guggenheim Exploration Company, and is located in the City of Mexico.—Sawin, Course V., is bacteriologist-in-charge at Katonah, N.Y.—Sellew, Course II., is chief engineer with the Pennsylvania Railroad at Cincinnati.—Stebbins is automobile designer with the Sheffield Car Company at Three Rivers, Mich.

1899.

DR. MILES S. SHERRILL, *Sec.*, Mass. Inst. of Technology.

On Saturday, March 4, James A. Patch was married to Miss Caroline Macduff Mackie at Beirût, Syria. Patch has been connected with the Syrian Protestant College of Beirût for five years, and is now professor of chemistry there. He writes enthusiastically of the work and the country. He has had many interesting experiences, having camped one summer among the cedars of Lebanon, journeyed across the desert with a caravan to the site of ancient Palmyra, and having taken several trips into the mountains and to the Holy Land.—C. B. Cluff is connected with the N. K. Fairbank Company in St. Louis, Mo. Soon after graduation he went to Chicago as chemist for the American Cotton Seed Oil Company. The N. K. Fairbank Company, to which he was recently transferred, is part of the same concern. Cluff writes that

he has not met many Tech men in St. Louis, and will miss the meetings of the North-western Alumni Association in Chicago. He is planning a trip East next summer, when he hopes to meet some of his old friends.—F. L. H. Kimball is at present in Manila, where he is consulting engineer for the Philippine Mining Company.—Stanley Motch has severed his connection with the Pennsylvania Steel Company in Lebanon, Pa., and, with his brother, E. R. Motch, Tech '97, and G. E. Merryweather, Tech '96, has taken over the business of the Marshall & Huschart Machinery Company in Cleveland, Ohio. The new company, of which Motch is treasurer, is known as the Motch & Merryweather Machine Company.—Carl S. Milliken is professor of biology in Ripon College, Ripon, Wis.—E. A. Packard has recently been appointed an examiner in the Patent Office at Washington.—Oscar G. Vogt was married Jan. 20, 1905, to Miss Kern, of Washington.

1900.

G. Edmond Russell, *Sec.*, 404 Stewart Avenue, Ithaca, N.Y.

The last number should have contained the announcement of the marriage of Mr. Charles H. Stratton to Miss Marion M. Woolley, of Baltimore.—A letter from George B. Moody, written from Bath, Me., under date of Nov. 18, 1904, announces his engagement to Miss Marion White, of that city.—According to the *Engineering News* (Jan. 19, 1905),—

> Lieutenant Charles T. Leeds, of the Engineer Corps, U.S.A., and Miss Amy L. Shapleigh were married at Newton, Mass., Jan. 12, 1905.

Leeds attended the Institute for three years, taking the architectural course.

1901.

E. B. BELCHER, *Sec.*, Malden, Mass.

At the class meeting held at the Union, on the evening of February 10, Mr. L. P. Wood gave an interesting talk on the Future Location of the Institute. Twelve men were present. The class will hold one more meeting before the close of the season, and it is hoped that every one who can will make an earnest attempt to be present.—Frank Cushman, Jr., formerly instructor in machine-tool work, is now located in Kansas City, Mo., where he is a director of the mechanic arts department of the Manual Training High School of that city.—Mr. E. S. Foljambe has severed his connection with the Y. M. C. A. Auto School, and will open a school at 66 Stanhope Street, Boston, for the instruction of owners and operators of all classes of automobiles. He is also prepared to make tests giving the horse power delivered at the wheels of any carriage.—Francis K. Baxter, Jr., is assistant superintendent of mines at Ingot, Shasta County, Cal.—E. J. Proulx is with the American Pipe Manufacturing Company at Philadelphia, Pa.—Theodore F. Sawyer is in the estimating department of the Standard Steel Car Company, Pittsburg, Pa.—J. R. Putnam has resigned as instructor of drawing and descriptive geometry, and is in the plan department of the Factory Mutual Fire Insurance Company of Boston.—D. L. Ordway is employed as chemist with the National Carbon Company of Cleveland, Ohio.—Ralph S. Loring is in Boise, Ida., where he is superintending the reconstruction of the Boise government barracks.—Archibald Klieves is a member of the firm of Franzheim & Klieves, architects, Wheeling, W. Va.—Warren I. Bickford is secretary of the Iron City Engineering Company, contracting electrical engineers.—Anthony W. Peters is located in Dodgeville, N.Y., where he is assistant to the city engineer.—R. L. Williams is working on the design of a six-cylinder rotary gasolene engine.—F. C. Ayres is in New London, Conn.—Allan T. Griffin, '01, Stamford University, '06, has received an appointment as professor in Shang-Tai College, Hong Kong,

China. He will teach mathematics there on a three years' contract.

1902.

CHARLES W. KELLOGG, Jr., *Sec.*, Edison Electric Illuminating Company, Brockton, Mass.

In response to a circular letter sent out to members of the class in January, numerous replies were received. The large number of marriages reported shows that the class is right-minded on the race suicide question. A. E. Hansen reports the birth of a son, L. Alaric Hansen, born on Dec. 30, 1904. Hansen is now assistant to Paul Gerhard, consulting sanitary engineer, 33 Union Square, New York City.—Pember was married on Jan. 2, 1905, to Miss Amy Gertrude Hewett, of Needham, Mass. They will be at home after April 1, at 21 Johnston Park, Buffalo, N.Y.—Pitts was married on June 22, 1904, to Miss Mabelle T. Slipp, of Dorchester, Mass.—Mather was blessed with a son, Judson Irving Mather, born on Sept. 13, 1904.—Harris is married, and has one son, Carl Wilson Harris, born Oct. 18, 1904.—L. E. Williams was married on Jan. 24, 1905, to Miss M. R. Florence Jacques, of Duluth, Minn. —Miss Edna M. W. Best was married on June 25, 1904, to Frederick H. Sexton, M. I. T., '01. They are living at 5 Jubilee Road, Halifax, N.S.—J. W. Smith was married on April 6, 1904, to Cleora Ranney Russell. They are living at 7 Forest Street, Lexington, Mass.—Larrabee was married on April 30, 1904, to Margaret Lyda Vanderpool, of Poughkeepsie, N.Y. He is in Porto Rico as engineer for the Mayaguez Electric Company of Mayaguez, P.R.—Red. Proctor has returned from his year of inactivity at Saranac Lake, apparently cured of tuberculosis. He is yard superintendent at the Vermont Marble Company, and leading a strenuous out-of-door life. He sleeps out of doors, and found the thermometer 16° below zero at the head of his bed one winter morning. He is also a director in the Proctor Trust Company, and in the Clarendon & Pittsfield Railroad Company.—R. A. Pope has

been taking the forestry course at Lawrence Scientific School, and expects to graduate in June.—Greeley is back in Boston with Sturgis & Barton, architects, 120 Boylston Street, Boston. He lives at 15 Trowbridge Street, Cambridge.—Eames is also back with the Miller & Franklin Company, production engineers and auditors, 319 Washington Street, Boston, Mass.—J. McF. Baker is taking a post-graduate course in architecture at the Institute.—Saylor is editor of the *Architectural Review*, 42 Chauncey Street, Boston. Address, 48 Beacon Street.—Bright is now manager of Bright & Co., hardware, Pottsville, Pa.—C. B. Allen has returned from a trip around the world, and is with the Westinghouse Machine Company. Address, 1303 Walnut Street, Edgewood Park, Pa.—Hammond is assistant engineer of bridge construction with the Buffalo & Susquehanna Railroad Company. Address, Belfast, N.Y.—Sears is mechanical assistant with the Charles River Basin Commission, 367 Boylston Street, Boston.—Raymond is with the Mississquoi Pulp Company, Sheldon Springs, Vt.—Gifford is with the Houghton County Electric Light Company.—Robbins's address after April 1 will be 32 North Second Street, Steelton, Pa.—Weeks has finished his apprenticeship with the Baldwin Locomotive Works, and is now assistant engineer of tests with that company.—Bartlett is with Simonson & Pietsch, American Building, Baltimore, Md.—W. V. Morse is assistant to the superintendent of construction and machinery of the American Smelting and Refining Company Aguascalientes, Mex.—Lockett has left the Hawley Down Draft Company to work for Adams & Schwab, consulting engineers, 1745 Railway Exchange Building, Chicago, Ill.—J. Philbrick is assistant superintendent of the Columbia Chemical Works, Brooklyn, N.Y. His address is 42 Strong Place, Brooklyn.—A large number of letters returned to the secretary show that the addresses of the following-named men are unknown to him (any information regarding their whereabouts will be gratefully received): C. S. Lawson, Foote, Lewis, Blanchard, Hamilton, I. Williams, Cummins, Ferrin, and Bates.—N. E. Borden is secretary of the Lowell Weaving Company, Lowell, Mass.—Comins is assistant superintendent St. Louis Mining and Smelting Company, Desloge, Mo.—Cutler is of the firm

of Cutler & Crossatte, Merchants, Market and Adams Streets, Chicago, Ill.—Durgin is with the Chicago Edison Company.—Friend is with the American Telephone and Telegraph Company, 125 Milk Street, Boston.—Frost is with the Railway Steel Spring Company, Pittsburg, Pa.—A. Gardner is in Charleston, S.C., with the Clark Construction Company.—S. A. Gardner is with the Holland Torpedo Boat Company of Bayonne, N.J.—Geromanos is with the Lackawanna Steel Company, Buffalo, N.Y.—J. C. Howe is with the Missouri & Kansas Telephone Company, Kansas City, Mo.—Lane is with the John W. Danforth Company, 70 Ellicott Street, Buffalo, N.Y.—McKechnie is a mining engineer, 665 Worcester Building, Portland, Ore.—MacNaughton is structural engineer with E. M. Lazarus, architect.—Marsh is teaching physics in the Case School of Applied Science in Cleveland, Ohio.—Millar is with the Boston Edison Company.—J. R. Morse is with the Tampa Electric Company, Tampa, Fla.—A. T. Nelson is at Fort Assinniboine, Mont.—E. E. Nelson is in the electrical engineering department at the Institute.—O'Connell is with the Aqueduct Commission, Patterson, N.Y.—Place is supervisor of elevator inspections, Travellers' Insurance Company, 31 Nassau Street, New York City.—Rice is with the Electric Launch Company, Bayonne, N.J.—Sisson is in Vallejo, Mex., as assistant engineer, Vallejo, Benicia & Napa Valley Railroad.—Stimson is with the North-western Telephone Exchange Company, Minneapolis, Minn.—Teague is instructor in the School of Mines, Kingston, Ontario.—Thanisch is with the Jeffrey Manufacturing Company, 41 Dey Street, New York City.—Thurston is with the Narragansett Electric Lighting Company, 204 Union Trust Building, Providence, R.I.—Tolman is chief engineer of the National Electric Company, Milwaukee, Wis.—Trowbridge is a draughtsman in the Ordnance Department at Washington, D.C.—Vatter is with the Missouri & Kansas Telephone Company, Kansas City, Mo.—Wales is an instructor in the College of Agriculture and Mechanic Arts at West Raleigh, N.C.—P. R. Whitney is an instructor in the University of Pennsylvania.—Brainerd is an instrument man with the D., L. & W. R.R., and his address after May 1 will be 62 Ashland Avenue, East Orange, N.J.—Marvin

has left the B. F. Sturtevant Company, and is with the William T. Bonner Company, 246 Summer Street, Boston.

1903.

WALTER H. ADAMS, *Sec.*, 22 Dix Street, Winchester, Mass.

Since the January number the bills for class dues have been sent out, as every one is aware. The response has not been as gratifying as I could wish. Less than half of the class have answered the letters. Please send in your name, address, and occupation, even if you do not send the dues. It is impossible to keep an accurate, up-to-date class record, if you fellows do not co-operate with the officers. We will keep the class going as long as the money holds out, but, remember, it costs money to send notices to over two hundred members of the class. The replies to the questions on the information blanks show that quite a large number have changed their address, and are with some other firms. The list of those who have married during the past year is as follows: A. E. Place to Miss Gertrude Lange; A. L. Fischer to Miss Grace E. Marsh on May 10, 1904; S. A. Foster to Miss Ethelyn Maud Jellison, of New Orleans, La., on August 3; E. E. Lockridge (XI.) to Miss Mary Louise Malone, of Denver, Col., on September 20; R. H. Howes (III.) to Miss Hannah N. Cushman on October 5; G. B. Woods (II.) to Miss Mary O. Folsom, of Dorchester, Mass., November 30; J. S. Bridges, Jr., to Miss Marion A. Fuller on December 31; M. Y. Ferris to Miss Elizabeth Leavitt, of Newton, Mass., on Feb. 14, 1905; and J. R. Bates to Miss Claire M. Doane on Feb. 14, 1905. At the time of Ferris's marriage he was sick with pneumonia. The following clipping is from the Boston *Journal* of the morning of February 15:—

Having put aside her wedding gown and having ordered the beautiful decorations for her wedding last night in Channing Unitarian Church, Newton, taken down, Miss Elizabeth Leavitt, the pretty daughter of Mr. and Mrs. John Leavitt, of Washington Street, Newton, at noon yesterday, stood at the bedside of Montgomery Yale Ferris, who is ill with pneumonia,

and became his bride seven hours earlier than the wedding invitations called for.

As was planned, the reception at the home of the bride was held last evening, and the loyal girl was showered with good wishes for herself and her unwillingly absent husband, who lay suffering at the home of his mother, Mrs. William Saville, in Waban.

I am glad to state that Ferris is now well on the road to recovery.—Cushman (I.) has announced his engagement to Miss Ivah Richardson, of Clinton, Mass. He is civil engineer with the Metropolitan Water and Sewerage Board, and is located at Clinton.—It is my sad duty to give notice of another death in the class: Andrew Percy Baker (I.), died on Dec. 29, 1904, of consumption, at his home in Kingston, Mass. He was compelled to leave his work at the Institute when his course was half finished, due to his ill-health. Nevertheless, he took a deep interest in all class affairs, and endeavored to be present at the reunions when his health permitted.—The following resolutions have been drawn up by a committee, consisting of Fales, Swett, and the secretary, and sent to the parents of W. C. Martin:—

Whereas the class has suffered loss by the death of William Chaille Martin, of Kyle, Tex., one of its active and interested members, one who was admired and respected by those who knew him, and

Whereas the class mourns his untimely death, and desires to express its sorrow for the sudden ending of a promising career, therefore,—

Be it Resolved, That the class express its sorrow by sending a copy of these resolutions to the parents of the deceased, by spreading them upon the records of the class, and by publishing them in the TECHNOLOGY REVIEW.

There have been no reunions held in Boston, owing to the apparent lack of interest among the members of the class in and around Boston. The annual dinner will be held soon, however, and the officers hope to see a large number of the class present.—The question of the Harvard-Tech Alliance has not been mentioned lately, as it was not brought up before the Corporation. The report is still in the hands of the committee. The work of the Tech Fund Committee is still going on, and it looks as though the fund would

be worthy of the alumni. '03 wants to brace up, however. While the class total is very good, the number of subscribers is less than 25 per cent. of the class. Now, fellows, don't wait any longer. Send in your pledge to-day. Don't be afraid to stand up for your Alma Mater. Show a little love for her. It isn't a case of pro-merger and anti-merger. It's a case of money to put Tech on its feet, so it can face the world, and say, We are ready for anything. As the class funds are low, no further direct appeal will be sent, probably; but that doesn't let a man off, if he hasn't subscribed. No names are published, and are not accessible to any one but members of the committee. The following is the information up to March 1: total pledge for five years, $5,758.50. That amount has been pledged by eighty-one men, less than one-quarter of the class. The amount of the subscriptions per man per year varies from two dollars to a hundred. The majority are from five to ten dollars a year. *Is your name on the list? If it isn't, have it put there.*

NECROLOGY

MACY STANTON POPE, '92

Macy Stanton Pope was born at East Machias, Washington County, Me., July 26, 1869. He sprang from sturdy New England stock, his father, James Otis Pope, and his mother, Olive Chase, both being natives of East Machias. His grandfather was Colonel William Pope, a well-known citizen of Boston.

His early life was spent under the good influences of the little town in which he was born. In the ship-yards and upon the extensive timber lands owned by his father, upon the chain of lakes and the East Machias River which flowed past his very door into the ocean but a short distance beyond, he grew up, and gained his knowledge of the woods and of the lumber industry,—simple and wholesome influences which developed the characteristics of sober thought and sturdy independence for which he was so marked in life.

He attended the public schools, and graduated from the Washington Academy at East Machias on June 20, 1888.

He entered the Massachusetts Institute of Technology in the fall of 1888, and graduated from the Department of Civil Engineering in May, 1892. Although reserved and quiet, he made his influence felt in the cause of good feeling and sense amongst his classmates, though he rarely appeared as a leader. He was even then mature beyond his years, and his great strength lay in his good balance and sanity of mind, which won the respect of his classmates and the warm friendship of those who knew him well.

Shortly after graduating, he entered the employ of the Associated Factory Mutual Fire Insurance Companies of Boston, the greater part of his time being spent on a series of tests of cast-iron water pipe and fittings, made at Nashua, N.H., under the direction of Mr. John R. Freeman.

In the fall of 1892 Mr. Pope returned to the Institute as assistant instructor in hydraulic engineering to Professor Dwight Porter,

where he remained until the following June. He then re-entered the employ of the Factory Mutuals, though a portion of his time was again devoted to the private work of Mr. Freeman in the preparation of designs for a new reservoir, dam, and pumping station for the Pennichuck Water Works at Nashua, N.H., and for repairs and improvements upon the water-power plant of the Piscataquis Pulp and Paper Company. From this time until February, 1898, his time was divided between testing work along various lines, in the laboratory of the Factory Mutuals, as well as in the field; to work in the plan department, involving the surveying of mills and the drawing up of plans of them; and private work done for Mr. Freeman. In the latter were included certain investigations relating to the water supplies of New York and Boston.

In February, 1898, under leave of absence from the company, Mr. Pope returned to his home at East Machias, where he gave his personal attention to his family estate and various allied lumber interests. At this time he also made a trip to the Southern States and California with his mother.

In June, 1900, he returned to the Factory Mutuals, and was employed in making special inspections of mills in different parts of the country. His broad experience in the inspection department of the Factory Mutuals, combined with his own business training, made him a most valuable man for this purpose. He had a strong grasp of the practical bearing of facts, and his ability to sift evidence in making special investigations, even in fields that were new to him, carried conviction. One of his associates happily says: "It is the verdict of all that the work done in each of these various fields was well done, and that the results were received by those who used them with the fullest confidence. In every case strong common sense and a clear appreciation of relative values were predominating characteristics."

Last June, Mr. Pope, feeling the need of rest and change, took a ten weeks' trip abroad. He was not well during the summer; and, shortly after his return, serious symptoms appeared, which developed into acute Bright's disease, of which after a month's illness he died at Brookline, Massachusetts, on Dec. 10, 1904.

Mr. Pope took a deep interest in engineering matters, and was a member of various engineering societies, such as the Boston Society of Civil Engineers, the American Society of Civil Engineers, the New England Water Works Association, and the Society of Arts, as well as of the Technology and Appalachian Mountain Clubs.

He was devoted to his old home, and took a warm and active interest in its affairs. For some years he had been one of the trustees of the Washington Academy at East Machias, and was much interested in its growth and development, and gave financial assistance to it on more than one occasion. His public interest was well illustrated by his liberality in giving to the town, with his two brothers, John A. and Warren F. Pope, a bridge across the East Machias River. This structure, a fine three-span concrete and steel masonry arch, they built as a memorial to the Pope family and as an object-lesson to the town. The memorial tablet upon the structure runs, in part, as follows:—

THIS BRIDGE IS ERECTED
IN MEMORY OF

WILLIAM POPE AND HIS SONS,
WILLIAM HENRY, SAMUEL WARREN, JOHN ADAMS,
ANDREW JACKSON, JAMES OTIS,
EDWIN, AND GEORGE WASHINGTON,

FOUNDERS OF A LUMBERING AND SHIPBUILDING
BUSINESS, WHICH BEGAN NEAR THIS SITE AND
EXTENDED TO NEIGHBORING TOWNS,
TO BOSTON, AND TO THE PACIFIC COAST,
AND WHICH WAS CONDUCTED BY THESE MEN
AND THEIR DESCENDANTS FROM
1807–1901.

His Alma Mater also commanded Mr. Pope's attention, and he always took a friendly interest in its welfare and progress. In his will he left it the substantial sum of $25,000, while other public bequests were made to the Washington Academy and various Maine hospitals.

Sound common sense, simple tastes with high ideals, love of work,

a just appreciation of nature, and a good knowledge of men were marked characteristics in the life of Macy Stanton Pope, who will long be remembered as a worthy example of a fine and virile type of New Englander.

LEONARD METCALF, '92.

JOSIAH PIERCE, JR., '85

Josiah Pierce, Jr., died at Washington of typhoid fever, July 30, 1902. He was a graduate of Emmanuel College, Cambridge, and entered the Institute in 1881 for a post-graduate course in civil engineering.

Although, naturally enough, known to comparatively few of the undergraduates, Pierce had many warm friends in 1885, to whom the news of his death brings a distinct sense of personal loss. He always regarded himself as a member of the class, and our own comparative immaturity did not prevent him from entering heartily into many of our affairs or from forming close personal relations with many of our members. In the sketch of his life which follows, and which is taken from *Emmanuel College Magazine*, there is an appreciation of his work and character which must interest and gratify his many Institute friends. We have little to add to the facts there given, but all that is said of his sunny disposition and manly character will find a quick response in the heart of every '85 man who knew him.

Many of us will remember how our class dinner menus and the pages of the early numbers of *The Tech* were enlivened by his sketches, his interest in every form of athletics, and his work upon the football team. His plane-table work is still spoken of with admiration. His audacity and humor were shown in the efforts which he made to secure his first position. He had applied for a place upon the Geological Survey, and waited day after day upon some high official, to whom at last, in desperation, he sent a sketch of an old woman caught upon a stile, underneath which was written, "Pray, sir, help me one way or t'other." The next day his appointment came.

Few Tech men have had a more varied or interesting career than came to Pierce, though his was so sadly short. The writer remembers meeting him at the Cosmos Club in Washington not long after the Spanish War. There was a warmth of inquiry regarding Tech friends, and then he was led to speak of his own experiences. He had found himself during the war the senior engineer officer in Porto Rico. He once penetrated the Spanish lines alone in search of information, built roads and bridges for our troops, and dispensed justice as the head of the highest military court; and there were then no others on the island. Several times it became his duty to pass capital sentences. He spoke of this with much feeling, as showing in what wholly unexpected forms one's duty might present itself.

Pierce was a wholly noble fellow; and, as classmates by right of his adoption, be it

Resolved, That the class of 1885 of the Massachusetts Institute of Technology desires to express its appreciation of the high character of Josiah Pierce, Jr., and its sense of the loss which the class has sustained by his death, by spreading upon its record the foregoing statement of his life-work and by causing a copy of these resolutions to be transmitted to his family.

Extracts (copied from *Emmanuel College Magazine*, Vol. XIV., No. 1, Cambridge, England, Michelmas Term, 1902):—

In our last number we briefly recorded the death of Josiah Pierce, one of the best-known figures in Emmanuel in the early eighties. Few more popular men, few more lovable characters, have ever been connected with the college; and his premature death is felt as a personal loss by his many friends both in Cambridge and in the wider world outside.

Pierce was born near St. Petersburg, where his father had been Secretary of the United States Legation, in January, 1861. He was descended from John Pierce, who settled in America in the early part of the seventeenth century, and took a leading part in the development and organization of the newly founded colonies there. One of his relatives, Franklin Pierce, was President of the United States. The name of another relative, Longfellow, is a familiar word in all English-speaking lands. . . .

He came into residence in October, 1879. It took some time for his

contemporaries to understand the nervous, shy Freshman who had come amongst them. A thorough American, he was not of our race. He had not passed through a great public school. But gradually "Jos.," to give him the name by which he was universally called, got to be known and appreciated, and during his second and third years he was the moving spirit in nearly everything that went on in the college. . . .

Nominally reading mathematics, his bent was social rather than studious. Still, he went out in honors in the Mathematical Tripos of June, 1882, and his B.A. degree was conferred on him on the day on which the want of tact of an official caused "The Battle of the Wooden Spoon" to be fought in the Senate House. Few who were present will forget how Pierce, when returning from kneeling before the Vice-Chancellor, took refuge from the mêlée on the pedestal of one of the statues, and from his post of vantage, in the full glory of a full Bachelor's hood, cheered on the bearers of the wooden spoon as they rushed up to the Senate House. It can safely be said that this was the only occasion when he was present while fun was going on and did not take a leading part in it.

After taking his degree, Pierce went out to the United States. There he first went through a course at the Massachusetts Institute of Technology, where, as at Cambridge, he is still recalled with affection, and then joined a party who were doing surveying work in the Rocky Mountains. He was now in his element. The dangers and adventures of the life appealed to him. The difficulties which had to be met and overcome by resource were a never-ending delight to him. After rather more than a year of this work he returned to England, and had the satisfaction of being present at the Lent races of 1885, when the College Boat began its ascending career. . . .

Making a short stay in England, he returned to the Western States to join the United States Geological Survey. There under Professor Wilson, who has spoken to me in the highest terms of what Pierce accomplished, he threw himself into the work with the utmost keenness. The mapping of a new region was to him no mere mechanical work: it was a science to be mastered and to be developed.

The United States Geological Survey, like our own Indian Survey, used for their mapping the "Plane-table" system, not the trigonometrical methods employed by the Ordnance Survey. Pierce was enthusiastic about the advantages of the Plane-table, and took the opportunity of a visit to London in 1887–89 to prepare a paper on its use, to be read at the Institution of Civil Engineers. The paper was followed by a long discussion, which soon resolved itself into a battle between the two systems. The Indian map

makers, with Sir Thomas Holdich at their head, came in force and sang the praises of their favorite instrument, somewhat to the discomfiture of the Ordnance Survey officials who were present. The discussion lasted over the first night, and filled up a second evening. The fact itself is evidence of the value of the paper, and the Council of the Institution subsequently showed their appreciation of it by awarding to Pierce a Telford medal and Telford premium.

This was the last time Pierce was in England. He returned to the States in the summer of 1888, and again joined the United States Geological Survey. Later he practised as a civil engineer at Baltimore and Washington. He also acted for a time as Professor of Engineering in one of the American universities, and as Principal Assistant Engineer of the Topographical Survey of Baltimore. Besides this he became a major in the Maryland National Guard, and on the outbreak of the Spanish-American War he obtained a commission as a major of engineers, and saw service in Porto Rico. It is unnecessary to describe his experiences in the war, as he himself has vividly, but with characteristic modesty, told them in a recent number of the college magazine. After the war he continued to practise as an engineer in Washington, doing much important work for numerous railroads and mining corporations, and became consulting engineer for the Great Falls Power Company at Washington, and also of the Susquehanna Power Company at Harrisburg, Pa. He was a member of the University Club of New York, the Metropolitan of Washington, the American Institute of Mining Engineers, a Fellow of the Royal Geographical Society of London, and the American Association for the Advancement of Science, etc. He was attacked by typhoid, and after a long illness died in the Garfield Hospital at Washington on the 20th of July, 1902, and his remains were laid to rest in the Dahlgren Memorial Chapel in Maryland. . . .